

**NOT YET SCHEDULED FOR ORAL ARGUMENT****Appeal No. 17-7035****(Consolidated with Appeal No. 17-7039)**

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**United States Court of Appeals****FOR THE DISTRICT OF COLUMBIA CIRCUIT**

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American Society for Testing and Materials; National Fire Protection  
Association, Inc.; and American Society of Heating, Refrigerating,  
and Air Conditioning Engineers, Inc.,

*Appellees,*

v.

Public.Resource.Org, Inc.,

*Appellant.*

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Appeal from the United States District Court for the District of Columbia  
Hon. Tanya S. Chutkan  
1:13-cv-1215-TSC  
1:14-cv-0857-TSC

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**PUBLIC APPENDIX – MATERIAL UNDER SEAL  
IN SEPARATE SUPPLEMENT  
VOLUME 1 (JA1-JA770)**

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**V. PUBLIC.RESOURCE.ORG, INC.**

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**CERTIFICATE OF SERVICE**

I, hereby certify that on January 31, 2018, I electronically filed the foregoing **Appendix** with the Clerk of the United States Court of Appeals for the District of Columbia Circuit by using the appellate CM/ECF system. I certify that all participants in the case are registered CM/ECF users and that service will be accomplished by the appellate CM/ECF system.

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USCA Case #17-7039

Document #1715850

Filed: 01/31/2018

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APPEAL,CLOSED,TYPE-E

**U.S. District Court  
District of Columbia (Washington, DC)  
CIVIL DOCKET FOR CASE #: 1:13-cv-01215-TSC**

AMERICAN SOCIETY FOR TESTING AND  
MATERIALS et al v. PUBLIC.RESOURCE.ORG, INC.

Assigned to: Judge Tanya S. Chutkan

Case: [1:14-cv-00857-TSC](#)

Case in other court: 17-07035

Cause: 17:501 Copyright Infringement

Date Filed: 08/06/2013

Date Terminated: 07/10/2017

Jury Demand: Defendant

Nature of Suit: 820 Copyright

Jurisdiction: Federal Question

**Plaintiff**

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TESTING AND MATERIALS**

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*ATTORNEY TO BE NOTICED*

**Michael Andrew Zee**  
U.S. DEPARTMENT OF JUSTICE  
Civil Division  
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*TERMINATED: 12/19/2014*  
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**Simeon Meir Schopf**

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Columbia, MD 21046  
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*TERMINATED: 01/29/2016*

**Michael Franck Clayton**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

V.

**Defendant****PUBLIC.RESOURCE.ORG, INC.**

represented by **Andrew Phillip Bridges**  
FENWICK & WEST, LLP  
555 California Street  
Suite 1200  
San Francisco, CA 94104  
(415) 875-2389  
Email: abridges@fenwick.com  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Mitchell L. Stoltz**  
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Fax: (415) 436-9993  
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**Corynne McSherry**  
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**David Elliot Halperin**  
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San Francisco, CA 94104  
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*TERMINATED: 10/14/2016*  
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**Amicus**

**AMERICAN NATIONAL  
STANDARDS INSTITUTE, INC.**

represented by **Bonnie Y. Hochman Rothell**  
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**Gerald W. Griffin**

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CARTER, LEDYARD & MILBURN  
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**Amicus**

**AMERICAN INSURANCE  
ASSOCIATION**  
*American Insurance Association*

represented by **Meegan F. Hollywood**  
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*LEAD ATTORNEY*  
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**INTERNATIONAL CODE  
COUNCIL, INC.**

represented by **Anthony A. Onorato**  
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**Amicus****PUBLIC KNOWLEDGE**

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*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Amicus****KNOWLEGE ECOLOGY  
INTERNATIONAL**

represented by **Charles Duan**  
(See above for address)  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Amicus****AMERICAN LIBRARY  
ASSOCIATION**

represented by **Charles Duan**  
(See above for address)  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Amicus****LAW SCHOLARS**

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*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Amicus****REPORTERS COMMITTEE FOR  
FREEDOM OF THE PRESS**

represented by **Bruce D. Brown**  
REPORTERS COMMITTEE FOR  
FREEDOM OF THE PRESS  
1156 15th St. NW  
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Fax: (202) 795-9310  
Email: [bbrown@rcfp.org](mailto:bbrown@rcfp.org)  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Counter Claimant****PUBLIC.RESOURCE.ORG, INC.**

represented by **Andrew Phillip Bridges**  
(See above for address)  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Mitchell L. Stoltz**  
(See above for address)  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Corynne McSherry**  
(See above for address)  
*PRO HAC VICE*  
*ATTORNEY TO BE NOTICED*

**David Elliot Halperin**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Matthew B. Becker**  
(See above for address)  
*PRO HAC VICE*  
*ATTORNEY TO BE NOTICED*

V.

**Counter Defendant****AMERICAN SOCIETY FOR  
TESTING AND MATERIALS**

represented by **Jordana Sara Rubel**  
(See above for address)  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**J. Kevin Fee**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Michael Franck Clayton**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Counter Defendant**

represented by

**JA9**

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**AMERICAN SOCIETY OF  
HEATING, REFRIGERATING,  
AND AIR-CONDITIONING  
ENGINEERS, INC.**

**Jeffrey Stuart Bucholtz**  
(See above for address)  
*LEAD ATTORNEY*  
*ATTORNEY TO BE NOTICED*

**Joseph R. Wetzel**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Kenneth L. Steinthal**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Simeon Meir Schopf**  
(See above for address)  
*TERMINATED: 01/29/2016*

**Michael Franck Clayton**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Counter Defendant**

**NATIONAL FIRE PROTECTION  
ASSOCIATION, INC.**

represented by **Rose Leda Ehler**  
(See above for address)  
*LEAD ATTORNEY*  
*PRO HAC VICE*  
*ATTORNEY TO BE NOTICED*

**Anjan Choudhury**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Jonathan H. Blavin**  
(See above for address)  
*ATTORNEY TO BE NOTICED*

**Kelly Klaus**  
(See above for address)  
*PRO HAC VICE*  
*ATTORNEY TO BE NOTICED*

**Michael J. Mongan**  
(See above for address)  
*TERMINATED: 07/18/2014*

**Nathan M. Rehn**  
(See above for address)  
*TERMINATED: 06/30/2016*  
*PRO HAC VICE*

**Michael Franck Clayton**  
 (See above for address)  
*ATTORNEY TO BE NOTICED*

| Date Filed | #                        | Docket Text   |
|------------|--------------------------|---|
| 08/06/2013 | <a href="#"><u>1</u></a> | COMPLAINT against PUBLIC.RESOURCE.ORG, INC. ( Filing fee \$ 400 receipt number 0090-3425373) filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Attachments: # <a href="#"><u>1</u></a> Exhibit Exhibit A, # <a href="#"><u>2</u></a> Exhibit Exhibit B, # <a href="#"><u>3</u></a> Exhibit Exhibit C, # <a href="#"><u>4</u></a> Exhibit Exhibit D, # <a href="#"><u>5</u></a> Exhibit Exhibit E, # <a href="#"><u>6</u></a> Exhibit Exhibit F, # <a href="#"><u>7</u></a> Exhibit Exhibit G, # <a href="#"><u>8</u></a> Exhibit Exhibit H, # <a href="#"><u>9</u></a> Exhibit Exhibit I, # <a href="#"><u>10</u></a> A0121 Form, # <a href="#"><u>11</u></a> Civil Cover Sheet Civil Cover Sheet, # <a href="#"><u>12</u></a> Summons Summons)(Clayton, Michael) (Entered: 08/06/2013) |
| 08/06/2013 | <a href="#"><u>2</u></a> | Corporate Disclosure Statement by AMERICAN SOCIETY FOR TESTING AND MATERIALS. (Clayton, Michael) (Entered: 08/06/2013)  |
| 08/06/2013 | <a href="#"><u>3</u></a> | LCvR 7.1 CERTIFICATE OF DISCLOSURE of Corporate Affiliations and Financial Interests by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Choudhury, Anjan) (Entered: 08/06/2013)   |
| 08/06/2013 | <a href="#"><u>4</u></a> | NOTICE of Appearance by Jeffrey S. Bucholtz on behalf of AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Bucholtz, Jeffrey) (Entered: 08/06/2013)   |
| 08/06/2013 | <a href="#"><u>5</u></a> | Corporate Disclosure Statement by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.. (Bucholtz, Jeffrey) (Entered: 08/06/2013)   |
| 08/06/2013 | <a href="#"><u>6</u></a> | NOTICE of Appearance by Anjan Choudhury on behalf of NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Choudhury, Anjan) (Entered: 08/06/2013)  |
| 08/06/2013 |                          | Case Assigned to Judge Emmet G. Sullivan. (sth, ) (Entered: 08/07/2013)   |
| 08/07/2013 |                          | SUMMONS Not Issued as to PUBLIC.RESOURCE.ORG, INC. (sth, ) (Entered: 08/07/2013)  |
| 08/07/2013 | <a href="#"><u>7</u></a> | REQUEST FOR SUMMONS TO ISSUE by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC..(Clayton, Michael) (Entered: 08/07/2013)   |
| 08/07/2013 | <a href="#"><u>8</u></a> |   |

|            |                    |  |
|------------|--------------------|--|
|            |                    | Electronic Summons (1) Issued as to PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Summons)(sth, ) (Entered: 08/07/2013)   |
| 08/08/2013 | <a href="#">9</a>  | RETURN OF SERVICE/AFFIDAVIT of Summons and Complaint Executed. PUBLIC.RESOURCE.ORG, INC. served on 8/7/2013, answer due 8/28/2013 (Clayton, Michael) (Entered: 08/08/2013)   |
| 08/12/2013 | <a href="#">10</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Joseph R. Wetzel, :Firm- King & Spalding LLP, :Address- 101 Second Street, Suite 2300, San Francisco, CA 94105. Phone No. - ( 415) 318-1200. Fax No. - (415) 318-1300 by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Attachments: # <a href="#">1</a> Declaration, # <a href="#">2</a> Text of Proposed Order)(Bucholtz, Jeffrey) (Entered: 08/12/2013)    |
| 08/12/2013 | <a href="#">11</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Kenneth L. Steinthal, :Firm- King & Spalding LLP, :Address- 101 Second Street, Suite 2300, San Francisco, CA 94105. Phone No. - (415) 318-1200. Fax No. - (415) 318-1300 by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Attachments: # <a href="#">1</a> Declaration, # <a href="#">2</a> Text of Proposed Order)(Bucholtz, Jeffrey) (Entered: 08/12/2013) |
| 08/13/2013 |                    | MINUTE ORDER granting <a href="#">10</a> and <a href="#">11</a> Motions for Admission Pro Hac Vice. Joseph R. Wetzel and Kenneth L. Steinthal are hereby admitted pro hac vice in this matter. Signed by Judge Emmet G. Sullivan on August 13, 2013. (lcegs4) (Entered: 08/13/2013)  |
| 08/20/2013 | <a href="#">12</a> | NOTICE of Appearance by Mitchell L. Stoltz on behalf of PUBLIC.RESOURCE.ORG, INC. (Stoltz, Mitchell) (Main Document 12 replaced on 8/21/2013) (jf, ). (Entered: 08/20/2013)  |
| 08/20/2013 | <a href="#">13</a> | STIPULATION and [Proposed] Order on Defendant's Time to Respond to Complaint by PUBLIC.RESOURCE.ORG, INC.. (Stoltz, Mitchell) (Entered: 08/20/2013)  |
| 08/21/2013 | <a href="#">14</a> | NOTICE of Appearance by David Elliot Halperin on behalf of PUBLIC.RESOURCE.ORG, INC. (Halperin, David) (Main Document 14 replaced on 8/22/2013) (jf, ). (Entered: 08/21/2013)  |
| 08/21/2013 |                    | MINUTE ORDER. The Court will construe <a href="#">13</a> Stipulation and Proposed Order on Defendant's Time to Respond to Complaint as a motion for extension of time to respond to the complaint and will GRANT the motion. Defendant shall respond to the complaint by no later than September 27, 2013. Signed by Judge Emmet G. Sullivan on August 21, 2013. (lcegs2) (Entered: 08/21/2013)  |
| 08/21/2013 |                    | Set/Reset Deadlines: Defendant shall respond to the complaint due by 9/27/2013 (tcb) (Entered: 08/21/2013)   |
| 08/28/2013 | <a href="#">15</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Michael J. Mongan, :Firm- Munger, Tolles & Olson LLP, :Address- 560 Mission Street, 27th Floor, San Francisco, CA 94105. Phone No. - (415) 512- 4051. Fax No. - (415) 512-4077 by NATIONAL FIRE PROTECTION ASSOCIATION, INC.   |

|            |                    |   |
|------------|--------------------|---|
|            |                    | (Attachments: # <a href="#">1</a> Declaration of Michael J. Mongan, # <a href="#">2</a> Text of Proposed Order)(Choudhury, Anjan) (Entered: 08/28/2013)   |
| 08/28/2013 | <a href="#">16</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Jonathan H. Blavin, :Firm- Munger, Tolles & Olson LLP, :Address- 560 Mission Street, 27th Floor, San Francisco, CA 94105. Phone No. - 415-512-4011. Fax No. - 415-512-4077 by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Declaration of Jonathan H. Blavin, # <a href="#">2</a> Text of Proposed Order)(Choudhury, Anjan) (Entered: 08/28/2013) |
| 08/28/2013 | <a href="#">17</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Kelly M. Klaus, :Firm- Munger, Tolles & Olson LLP, :Address- 560 Mission Street, 27th Floor, San Francisco, CA 94105. Phone No. - 415-512-4017. Fax No. - 415-512-4077 by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Declaration of Kelly M. Klaus, # <a href="#">2</a> Text of Proposed Order)(Choudhury, Anjan) (Entered: 08/28/2013)         |
| 08/29/2013 |                    | MINUTE ORDER granting <a href="#">15</a> motion to appear pro hac vice. Michael J. Mongan is hereby admitted pro hac vice in this action. Signed by Judge Emmet G. Sullivan on August 29, 2013. (lcegs1) (Entered: 08/29/2013)  |
| 08/29/2013 |                    | MINUTE ORDER granting <a href="#">16</a> motion to appear pro hac vice. Jonathan H. Blavin is hereby admitted pro hac vice in this action. Signed by Judge Emmet G. Sullivan on August 29, 2013. (lcegs1) (Entered: 08/29/2013)   |
| 08/29/2013 |                    | MINUTE ORDER granting <a href="#">17</a> motion to appear pro hac vice. Kelly M. Klaus is hereby admitted pro hac vice in this action. Signed by Judge Emmet G. Sullivan on August 29, 2013. (lcegs1) (Entered: 08/29/2013)   |
| 09/16/2013 | <a href="#">18</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Corynne McSherry, :Firm- Electronic Frontier Foundation, :Address- 815 Eddy Street, San Francisco, CA 94109. Phone No. - 415-436-9333. Fax No. - 415-436-9993 by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Declaration of Corynne McSherry, # <a href="#">2</a> Text of Proposed Order)(Stoltz, Mitchell) (Entered: 09/16/2013)                                 |
| 09/23/2013 |                    | MINUTE ORDER granting <a href="#">18</a> Corynne McSherry's motion for leave to appear pro hac vice in this matter. Signed by Judge Emmet G. Sullivan on September 23, 2013. (lcegs4) (Entered: 09/23/2013)   |
| 09/24/2013 | <a href="#">19</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Kathleen Lu, :Firm- Fenwick & West LLP, :Address- 555 California St., 12th Floor, San Francisco, CA 94104. Phone No. - 415.875.2300. Fax No. - 415.281.1350 by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Affidavit of Kathleen Lu, # <a href="#">2</a> Text of Proposed Order)(Stoltz, Mitchell) (Entered: 09/24/2013)  |
| 09/24/2013 | <a href="#">20</a> | NOTICE of Appearance by Andrew Phillip Bridges on behalf of PUBLIC.RESOURCE.ORG, INC. (Bridges, Andrew) (Entered: 09/24/2013)   |
| 09/27/2013 | <a href="#">21</a> | <i>Public.Resource.Org, Inc.'s</i> ANSWER to Complaint with Jury Demand for <i>Injunctive Relief</i> , COUNTERCLAIM for <i>Declaratory Relief</i> against All Plaintiffs by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Exhibit A, #   |

|            |                    |  |
|------------|--------------------|--|
|            |                    | <a href="#">2</a> Exhibit B, # <a href="#">3</a> Exhibit C, # <a href="#">4</a> Exhibit D, # <a href="#">5</a> Exhibit E)(Bridges, Andrew) (Entered: 09/27/2013)   |
| 09/27/2013 | <a href="#">22</a> | Corporate Disclosure Statement by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) (Entered: 09/27/2013)   |
| 09/30/2013 |                    | MINUTE ORDER granting <a href="#">19</a> motion to admit Kathleen Lu pro hac vice in this matter. Signed by Judge Emmet G. Sullivan on September 30, 2013. (lcegs4) (Entered: 09/30/2013)  |
| 10/15/2013 | <a href="#">23</a> | STIPULATION re <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, and [Proposed] Order by AMERICAN SOCIETY FOR TESTING AND MATERIALS. (Fee, J.) (Entered: 10/15/2013)  |
| 10/16/2013 | <a href="#">24</a> | NOTICE of Appearance by J. Kevin Fee on behalf of AMERICAN SOCIETY FOR TESTING AND MATERIALS (Fee, J.) (Entered: 10/16/2013)   |
| 10/17/2013 |                    | MINUTE ORDER. The Court has received <a href="#">23</a> the parties' Stipulation, which requests that the Court extend the deadline for plaintiffs to respond to defendant's counterclaim and set a briefing schedule for any oppositions and replies to any motions that may be filed in response to defendant's counterclaim. It is hereby ORDERED that plaintiffs' responses to defendant's counterclaim shall be filed by no later than November 20, 2013. If any plaintiff files a motion in response to defendant's counterclaim, defendant's opposition to that motion shall be filed by no later than December 18, 2013, and plaintiffs shall file any reply in further support of the motion by no later than January 15, 2014. Signed by Judge Emmet G. Sullivan on October 17, 2013. (lcegs2) (Entered: 10/17/2013) |
| 10/18/2013 |                    | Set/Reset Deadlines: Plaintiff's Response to Defendant's Counterclaim due by 11/20/2013. Defendant's Opposition to Plaintiff's Motion due by 12/18/2013. Plaintiff's Reply in Support of Motion due by 1/15/2014. (mac) (Entered: 10/18/2013)  |
| 11/20/2013 | <a href="#">25</a> | ANSWER to <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. Related document: <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, filed by PUBLIC.RESOURCE.ORG, INC..(Clayton, Michael) (Entered: 11/20/2013)   |
| 11/20/2013 | <a href="#">26</a> | Counter Defendant The American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.'s ANSWER to <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, of Public.Resource.Org, Inc. for Declaratory Judgment by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.. Related document: <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, filed by PUBLIC.RESOURCE.ORG, INC.. (Steinthal, Kenneth) (Entered: 11/20/2013)   |
| 11/20/2013 | <a href="#">27</a> | ANSWER to <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. Related document: <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, filed by PUBLIC.RESOURCE.ORG, INC.. (Choudhury, Anjan) (Entered: 11/20/2013)  |

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|            |                    |   |
|------------|--------------------|---|
| 11/22/2013 | <a href="#">28</a> | ORDER FOR MEET AND CONFER REPORT. Attorney Meet and Confer Conference due by 12/16/2013. Meet & Confer Statement due by 12/30/2013. Signed by Judge Emmet G. Sullivan on 11/22/2013. (mac) (Entered: 11/22/2013)  |
| 12/30/2013 | <a href="#">29</a> | MEET AND CONFER STATEMENT. (Fee, J.) (Entered: 12/30/2013)  |
| 12/31/2013 | <a href="#">30</a> | SCHEDULING ORDER. The parties are directed to read this Order in its entirety upon receipt. The Court will hold a status hearing in this case on April 30, 2015 at 11:00 a.m. in Courtroom 24A. Signed by Judge Emmet G. Sullivan on December 31, 2013. (lcegs2) (Entered: 12/31/2013)  |
| 01/06/2014 |                    | Set/Reset Deadlines/Hearings: Initial Disclosure due by 1/17/2014. Amended Pleadings due by 3/14/2014. Fact Discovery due by 10/3/2014. Expert Disclosures ( Rule 26a2) due by 12/2/2014. Opening Expert Disclosures ( Rule 26a2) due by 1/16/2015. Replies to Rebuttal Disclosures due by 3/2/2015. Reply Expert Disclosures due by 3/16/2015. Expert Discovery due by 4/16/2015. Status Report due by 11/3/2014. Status Conference set for 4/30/2015 11:00 AM in Courtroom 24A before Judge Emmet G. Sullivan. Joint Recommendation due by 4/23/2015. (mac) (Entered: 01/06/2014)   |
| 06/11/2014 |                    | Case reassigned to Judge Tanya S. Chutkan. Judge Emmet G. Sullivan no longer assigned to the case. (ztnr, ) (Entered: 06/11/2014)   |
| 07/07/2014 | <a href="#">31</a> | MOTION for Order of <i>Protection</i> by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Exhibit A - Proposed Order, # <a href="#">2</a> Exhibit B - Declaration of Jordana Rubel, # <a href="#">3</a> Exhibit B - Declaration Exh. 1, # <a href="#">4</a> Exhibit B - Declaration Exh. 2, # <a href="#">5</a> Exhibit B - Declaration Exh. 3, # <a href="#">6</a> Exhibit B - Declaration Exh. 4, # <a href="#">7</a> Exhibit B - Declaration Exh. 5, # <a href="#">8</a> Exhibit B - Declaration Exh. 6, # <a href="#">9</a> Exhibit B - Declaration Exh. 7, # <a href="#">10</a> Exhibit B - Declaration Exh. 8, # <a href="#">11</a> Exhibit B - Declaration Exh. 9, # <a href="#">12</a> Exhibit B - Declaration Exh. 10, # <a href="#">13</a> Exhibit B - Declaration Exh. 11, # <a href="#">14</a> Exhibit B - Declaration Exh. 12, # <a href="#">15</a> Exhibit B - Declaration Exh. 13, # <a href="#">16</a> Exhibit B - Declaration Exh. 14, # <a href="#">17</a> Exhibit B - Declaration Exh. 15, # <a href="#">18</a> Exhibit B - Declaration Exh. 16, # <a href="#">19</a> Exhibit B - Declaration Exh. 17, # <a href="#">20</a> Exhibit B - Declaration Exh. 18, # <a href="#">21</a> Exhibit B - Declaration Exh. 19, # <a href="#">22</a> Exhibit B - Declaration Exh. 20, # <a href="#">23</a> Exhibit B - Declaration Exh. 21, # <a href="#">24</a> Exhibit B - Declaration Exh. 22, # <a href="#">25</a> Exhibit B - Declaration Exh. 23, # <a href="#">26</a> Exhibit B - Declaration Exh. 24, # <a href="#">27</a> Exhibit C) (Fee, J.) (Entered: 07/07/2014) |
| 07/18/2014 | <a href="#">32</a> | NOTICE OF WITHDRAWAL OF APPEARANCE as to NATIONAL FIRE PROTECTION ASSOCIATION, INC.. Attorney Michael J. Mongan terminated. (Choudhury, Anjan) (Entered: 07/18/2014)  |
| 07/24/2014 | <a href="#">33</a> | RESPONSE re <a href="#">31</a> MOTION for Order of <i>Protection</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Text of Proposed Order (Exhibit A), # <a href="#">2</a> Declaration of Andrew P. Bridges (Exhibit B), # <a href="#">3</a> Exhibit B-1, # <a href="#">4</a> Exhibit B-2, # <a href="#">5</a> Exhibit B-3, # <a href="#">6</a> Declaration of Carl Malamud (Exhibit C))(Bridges, Andrew) (Entered: 07/24/2014)   |

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| 08/08/2014 | <a href="#">34</a> | MOTION to Strike <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, <i>Jury Demand Only and Request for Oral Argument</i> by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Fee, J.). Added MOTION for Oral Argument on 8/11/2014 (td, ). (Entered: 08/08/2014)   |
| 08/13/2014 | <a href="#">35</a> | Consent MOTION to File Reply Brief out of Time re <a href="#">33</a> Response to motion, by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Exhibit Plaintiffs' Reply in Support of Motion for Protective Order, # <a href="#">2</a> Text of Proposed Order)(Fee, J.) (Entered: 08/13/2014)   |
| 08/14/2014 |                    | MINUTE ORDER: Granting Plaintiffs' <a href="#">35</a> Consent Motion to File Reply Brief out of time. Plaintiffs shall refile the brief as a separate document. Signed by Judge Tanya S. Chutkan on 8/14/14. (djs) (Entered: 08/14/2014)   |
| 08/15/2014 | <a href="#">36</a> | REPLY to opposition to motion re <a href="#">31</a> MOTION for Order of Protection filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Fee, J.) (Entered: 08/15/2014)  |
| 08/15/2014 | <a href="#">37</a> | Consent MOTION for Extension of Time to Complete Discovery and Case Schedule by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Text of Proposed Order Granting Defendant's Consent Motion to Extend Discovery and Case Schedule)(Bridges, Andrew) (Entered: 08/15/2014)   |
| 08/20/2014 |                    | MINUTE ORDER: A Hearing is hereby set for 9/16/14, 2014 at 1:30 p.m. in Courtroom 2 on Plaintiff's <a href="#">31</a> Motion for a Protective Order and the parties' <a href="#">37</a> Consent Motion for Extension of Time to Complete Discovery and Case Schedule. If the parties or their counsel are unable to attend in person, they may attend by phone. Any persons attending via telephone shall JOINTLY telephone chambers at 202-354-3390 shortly before the hearing begins. All persons on the joint telephone call must call from a landline, rather than a cell phone. Motion Hearing set for 9/16/2014 01:30 PM in Courtroom 2 before Judge Tanya S. Chutkan. Signed by Judge Tanya S. Chutkan on 8/20/14. (DJS) Motion Hearing set for 9/16/2014 01:30 PM in Courtroom 2 before Judge Tanya S. Chutkan. Pre-motion Conference set for 9/16/2014 01:30 PM in Courtroom 2 before Judge Tanya S. Chutkan.. Signed by Judge Tanya S. Chutkan on 8/20/14. (DJS, ) (Entered: 08/20/2014) |
| 08/25/2014 | <a href="#">38</a> | Memorandum in opposition to re <a href="#">34</a> MOTION to Strike <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, <i>Jury Demand Only and Request for Oral Argument</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Text of Proposed Order)(Stoltz, Mitchell) (Entered: 08/25/2014)  |
| 09/05/2014 | <a href="#">39</a> | REPLY to opposition to motion re <a href="#">34</a> MOTION to Strike <a href="#">21</a> Answer to Complaint, COUNTERCLAIM,, <i>Jury Demand Only and Request for Oral Argument</i> filed by AMERICAN SOCIETY FOR TESTING AND  |

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|            |                    | MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Clayton, Michael) (Entered: 09/05/2014)  |
| 09/10/2014 | <a href="#">40</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Nahtan M. Rehn, :Firm- Munger, Tolles & Olson LLP, :Address- 560 Mission Street, 27th Floor, San Francisco, CA 94105. Phone No. - (415) 512-4000. Fax No. - (415) 512-4077 Filing fee \$ 100, receipt number 0090-3835256. Fee Status: Fee Paid. by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Declaration of Nathan Rehn ISO, # <a href="#">2</a> Text of Proposed Order)(Choudhury, Anjan) (Entered: 09/10/2014)   |
| 09/15/2014 | <a href="#">41</a> | MOTION to Compel <i>Discovery</i> by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Text of Proposed Order Granting Defendant's Motion to Compel Discovery (Exhibit A), # <a href="#">2</a> Declaration of Kathleen Lu in Support of Defendant's Motion to Compel (Exhibit B), # <a href="#">3</a> Exhibit 1 to Decl of Kathleen Lu, # <a href="#">4</a> Exhibit 2 to Decl of Kathleen Lu, # <a href="#">5</a> Exhibit 3 to Decl of Kathleen Lu, # <a href="#">6</a> Exhibit 4 to Decl of Kathleen Lu, # <a href="#">7</a> Exhibit 5 to Decl of Kathleen Lu, # <a href="#">8</a> Exhibit 6 to Decl of Kathleen Lu, # <a href="#">9</a> Exhibit 7 to Decl of Kathleen Lu, # <a href="#">10</a> Exhibit 8 to Decl of Kathleen Lu, # <a href="#">11</a> Exhibit 9 to Decl of Kathleen Lu, # <a href="#">12</a> Exhibit 10 to Decl of Kathleen Lu, # <a href="#">13</a> Exhibit 11 to Decl of Kathleen Lu, # <a href="#">14</a> Exhibit 12 to Decl of Kathleen Lu, # <a href="#">15</a> Exhibit 13 to Decl of Kathleen Lu, # <a href="#">16</a> Exhibit 14 to Decl of Kathleen Lu, # <a href="#">17</a> Exhibit 15 to Decl of Kathleen Lu)(Bridges, Andrew) (Entered: 09/15/2014) |
| 09/16/2014 |                    | Minute Entry for proceedings held before Judge Tanya S. Chutkan: Motion Hearing held on 9/16/2014 re <a href="#">31</a> MOTION for Order of <i>Protection</i> filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC., AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. Protective order conditions revised for reasons stated on the record. Revised protective order to be submitted to the court for approval. Case to be referred to a Magistrate Judge for discovery disputes. Order to follow. (Court Reporter: William Zaremba.) (tj ) (Entered: 09/16/2014)  |
| 09/17/2014 |                    | MINUTE ORDER: Granting <a href="#">37</a> Consent Motion to Extend Discovery and Case Schedule. Set/Reset Deadlines/Hearings: Fact Discovery due by 12/5/2014. Status Report due by 1/5/2015. Expert Disclosures due by 2/2/2015. Opposition Expert Disclosures due by 3/16/2015. Rebuttal Expert Disclosures due by 5/4/2015. Reply Expert Disclosures due by 5/18/2015. Expert Discovery due by 6/16/2015. Status Report and Joint Recommendation due by 6/23/2015. Status Conference set for 6/30/2015 at 10:30 AM in Courtroom 2 before Judge Tanya S. Chutkan. Signed by Judge Tanya S. Chutkan on 09/17/2014. (lctsc2) (Entered: 09/17/2014)   |
| 09/17/2014 |                    | MINUTE ORDER: Granting in part and denying in part <a href="#">31</a> Plaintiffs' Motion for Order of Protection for the reasons stated on the record at the hearing held September 16, 2014. The parties shall file a revised protective order consistent with the Court's rulings by September 22, 2014. The parties are also instructed   |

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|            |                    | to e-mail Chambers the proposed protective order in Word format.. Signed by Judge Tanya S. Chutkan on 09/17/2014. (lctsc2) (Entered: 09/17/2014)   |
| 09/17/2014 |                    | MINUTE ORDER: Granting <a href="#">40</a> Motion for Leave to Appear Pro Hac Vice. Attorney NATHAN M. REHN is hereby admitted pro hac vice to appear in this matter on behalf of plaintiff National Fire Protection Association, Inc. Signed by Judge Tanya S. Chutkan on 9/17/14. (DJS) (Entered: 09/17/2014)   |
| 09/17/2014 | <a href="#">42</a> | Consent MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Michael Andrew Zee, :Firm- King & Spalding LLP, :Address- 101 Second Street, Suite 2300, San Francisco, CA 94105. Phone No. - (415) 318-1222. Fax No. - (415) 318-1300 Filing fee \$ 100, receipt number 0090-3842463. Fee Status: Fee Paid. by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Attachments: # <a href="#">1</a> Declaration, # <a href="#">2</a> Text of Proposed Order)(Bucholtz, Jeffrey) (Entered: 09/17/2014)   |
| 09/18/2014 |                    | MINUTE ORDER: Granting <a href="#">42</a> Motion for Leave to Appear Pro Hac Vice. Attorney Michael Andrew Zee is hereby admitted pro hac vice to appear in this matter on behalf of plaintiff American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. Signed by Judge Tanya S. Chutkan on 9/18/14. (DJS) (Entered: 09/18/2014)   |
| 09/22/2014 | <a href="#">43</a> | STIPULATION re Order on Motion for Order, <i>Proposed Protective Order</i> by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Fee, J.) (Entered: 09/22/2014)  |
| 09/23/2014 | <a href="#">44</a> | STIPULATION AND ORDER: Entering the stipulated <a href="#">43</a> Protective Order submitted by the parties. Signed by Judge Tanya S. Chutkan on 09/23/2014. (lctsc2) (Entered: 09/23/2014)  |
| 09/23/2014 |                    | ORDER OF REFERRAL: The Court has determined that this action should be referred to a magistrate judge for all issues <i>related to discovery</i> , including the Defendant's pending Motion to Compel (ECF No. 41). The parties are reminded, pursuant to LCvR 73.1, that this action may be referred for all purposes, including trial, upon the filing of an executed notice of consent by all parties. Consent of the District Court Judge is not necessary. Accordingly, it is hereby ORDERED that this action is referred to a magistrate judge for discovery only, beginning immediately; the magistrate judge will be randomly assigned by the Clerk's Office; and it is FURTHER ORDERED that any future filings related to discovery in this action shall have the initials of Judge Tanya Chutkan and the magistrate judge following the case number in the caption. Signed by Judge Tanya S. Chutkan on 09/23/2014. (lctsc2) (Entered: 09/23/2014) |
| 09/23/2014 | <a href="#">45</a> | CASE Randomly REFERRED to Magistrate Judge Deborah A. Robinson for all discovery. (kb) (Entered: 09/25/2014)   |
| 09/26/2014 |                    |  |

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|            |                    | Set/Reset Hearings: Motion Hearing on <a href="#">41</a> Defendant's Motion to Compel set for 10/13/2014 at 03:00 PM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. (lcdar2) (Entered: 09/26/2014)   |
| 09/29/2014 |                    | MINUTE ORDER: It is hereby ORDERED that the motion hearing is rescheduled for 3:00 PM on Tuesday 10/14/2014. The hearing was mistakenly scheduled on a holiday. Set/Reset Hearings: Motion Hearing set for 10/14/2014 at 03:00 PM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. Signed by Magistrate Judge Deborah A. Robinson on September 29, 2014. (SRH) (Entered: 09/29/2014)   |
| 10/02/2014 | <a href="#">46</a> | Memorandum in opposition to re <a href="#">41</a> MOTION to Compel <i>Discovery Plaintiff National Fire Protection Association, Inc.'s Opposition to Motion to Compel Discovery</i> filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Attachments: # <a href="#">1</a> Declaration of Christian Dubay In Support of, # <a href="#">2</a> Declaration Dennis Berry In Support of)(Klaus, Kelly) (Entered: 10/02/2014)  |
| 10/02/2014 | <a href="#">47</a> | Memorandum in opposition to re <a href="#">41</a> MOTION to Compel <i>Discovery</i> filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS. (Attachments: # <a href="#">1</a> Exhibit Ex. A Declaration of Jordana Rubel in Support of Plaintiff's Opposition to Defendant's Motion to Compel Discovery, # <a href="#">2</a> Exhibit Ex. B Declaration of Norma Jane Hair in Support of Plaintiff's Opposition to Defendant's Motion to Compel Discovery)(Fee, J.) (Entered: 10/02/2014) |
| 10/02/2014 | <a href="#">48</a> | Memorandum in opposition to re <a href="#">41</a> MOTION to Compel <i>Discovery</i> filed by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.. (Attachments: # <a href="#">1</a> Declaration of M. Andrew Zee, # <a href="#">2</a> Exhibit 1, # <a href="#">3</a> Exhibit 2, # <a href="#">4</a> Declaration of Claire Ramspeck) (Steinthal, Kenneth) (Entered: 10/02/2014)   |
| 10/09/2014 | <a href="#">49</a> | Unopposed MOTION for Leave to Appear TELEPHONICALLY <i>AT OCTOBER 14, 2014 HEARING</i> by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.. (Attachments: # <a href="#">1</a> Text of Proposed Order)(Steinthal, Kenneth) (Entered: 10/09/2014)   |
| 10/10/2014 |                    | MINUTE ORDER granting <a href="#">49</a> Plaintiff-Counterdefendant American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.'s Unopposed Motion for Leave to Appear by Telephone. Signed by Magistrate Judge Deborah A. Robinson on October 10, 2014. (SRH) (Entered: 10/10/2014)   |
| 10/10/2014 | <a href="#">50</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Matthew B. Becker, :Firm- Fenwick & West LLP, :Address- 801 California Street, Mountain View, California 94041. Phone No. - (650) 335-7930. Fax No. - (650) 938-5200 Filing fee \$ 100, receipt number 0090-3869285. Fee Status: Fee Paid. by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Declaration, # <a href="#">2</a> Text of Proposed Order)(Stoltz, Mitchell) (Entered: 10/10/2014)                    |
| 10/11/2014 |                    | MINUTE ORDER: Granting <a href="#">50</a> Motion for Leave to Appear Pro Hac Vice. Attorney Matthew B. Becker is hereby admitted pro hac vice to appear in this matter on behalf of defendant Public.Resource.Org, Inc. Signed by Judge Tanya S. Chutkan on 10/11/14. (DJS ) (Entered: 10/11/2014)  |

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| 10/13/2014 | <a href="#"><u>51</u></a> | REPLY to opposition to motion re <a href="#"><u>41</u></a> MOTION to Compel <i>Discovery</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#"><u>1</u></a> Declaration of Andrew P. Bridges in Support of Defendant's Reply re Motion to Compel Discovery, # <a href="#"><u>2</u></a> Exhibit 1 to Declaration of Andrew Bridges, # <a href="#"><u>3</u></a> Errata 2 to Declaration of Andrew Bridges)(Bridges, Andrew) (Entered: 10/13/2014)  |
| 10/14/2014 | <a href="#"><u>52</u></a> | NOTICE of Appearance by Jordana Sara Rubel on behalf of AMERICAN SOCIETY FOR TESTING AND MATERIALS, (ztnr, ) (Entered: 10/14/2014)   |
| 10/14/2014 |                           | MINUTE ORDER: The hearing on Defendant Public.Resource.Org, Inc.'s Motion to Compel Discovery (Document No. 41), which was scheduled for 3:00 p.m. on this date, is, after consultation with counsel for the parties, continued to 3:00 p.m. on Wednesday, October 15, 2014. The court apologizes to counsel and the parties for the inconvenience this continuance has caused. Counsel are encouraged to use the intervening period to meet and confer in an effort to narrow the discovery disputes which are the subject of the motion. Set/Reset Hearings: Motion Hearing set for 10/15/2014 at 03:00 PM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. Signed by Magistrate Judge Deborah A. Robinson on October 14, 2014. (SRH) (Entered: 10/14/2014) |
| 10/15/2014 |                           | Minute Entry for proceedings held before Magistrate Judge Deborah A. Robinson: Motion Hearing held on 10/15/2014 re <a href="#"><u>41</u></a> MOTION to Compel <i>Discovery</i> filed by PUBLIC.RESOURCE.ORG, INC. The court heard preliminary arguments of counsel regarding the status of the Motion. The court directed counsel and the parties to continue to meet and confer in an effort to resolve disputes. The court scheduled a Further Motion Hearing set for 10/28/2014 03:00 PM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. (Court Reporter Bowles Reporting Services)(FTR Time Frame: 3:17:30 - 3:47:06, Crtrm 4). (zcmm, ) (Entered: 10/15/2014)  |
| 10/24/2014 | <a href="#"><u>53</u></a> | Unopposed MOTION for Leave to Appear <i>Telephonically at October 28, 2014 Hearing</i> by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#"><u>1</u></a> Text of Proposed Order)(Steinthal, Kenneth) (Entered: 10/24/2014)  |
| 10/27/2014 |                           | MINUTE ORDER: It is hereby ORDERED that counsel for Plaintiffs-Counterdefendants American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. and the National Fire Protection Association, Inc.'s Unopposed Motion to Allow Telephonic Appearance at the October 28, 2014 (Document No. 53) is GRANTED. Signed by Magistrate Judge Deborah A. Robinson on October 27, 2014. (SRH) (Entered: 10/27/2014)   |
| 10/28/2014 |                           | Minute Entry for proceedings held before Magistrate Judge Deborah A. Robinson: Status Conference held on 10/28/2014. Case called for Motion Hearing but not held. By no later than 11/04/2014, counsel shall file a proposed order indicating with reference to <a href="#"><u>41</u></a> Motion to Compel the matters that have been resolved. Counsel shall include a provision that with respect to those issues the motion maybe denied as moot. Parties are directed to continue to confer. A Further Status Conference is set for 12/1/2014 11:00 AM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. (Court Reporter   |

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|            |                    | Bowles Reporting Services.)(FTR Time Frame: 3:30:53 - 3:58:59, Ctrtm 4) (zcmm, ) (Entered: 10/28/2014)  |
| 10/28/2014 |                    | Set/Reset Hearings: Status Conference is scheduled for Monday, December 1, 2014 at 11:00 AM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. (SRH) (Entered: 12/01/2014)   |
| 11/04/2014 | <a href="#">54</a> | STATUS REPORT <i>Joint Status Report and [Proposed] Order On Defendant's Motion to Compel Discovery</i> by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) (Entered: 11/04/2014)   |
| 11/17/2014 | <a href="#">55</a> | TRANSCRIPT OF PROCEEDINGS before Judge Tanya S. Chutkan held on September 16, 2014; Page Numbers: 1-24; Date of Issuance: November 17, 2014. Court Reporter/Transcriber: William Zaremba; Telephone number 202-354-3249; Court Reporter Email Address: William_Zaremba@dcd.uscourts.gov.<P></P>For the first 90 days after this filing date, the transcript may be viewed at the courthouse at a public terminal or purchased from the court reporter referenced above. After 90 days, the transcript may be accessed via PACER. Other transcript formats, (multi-page, condensed, PDF or ASCII) may be purchased from the court reporter.<P> <b>NOTICE RE REDACTION OF TRANSCRIPTS:</b> The parties have twenty-one days to file with the court and the court reporter any request to redact personal identifiers from this transcript. If no such requests are filed, the transcript will be made available to the public via PACER without redaction after 90 days. The policy, which includes the five personal identifiers specifically covered, is located on our website at www.dcd.uscourts.gov.<P></P>Redaction Request due 12/8/2014. Redacted Transcript Deadline set for 12/18/2014. Release of Transcript Restriction set for 2/15/2015.(Zaremba, William) (Entered: 11/17/2014) |
| 11/21/2014 |                    | MINUTE ORDER: Setting Hearing on <a href="#">34</a> MOTION to Strike Defendant's Jury Demand. Motion Hearing set for 12/4/2014 11:30 AM in Courtroom 2 before Judge Tanya S. Chutkan. Signed by Judge Tanya S. Chutkan on 11/21/2014. (lctsc2) (Entered: 11/21/2014)  |
| 11/24/2014 | <a href="#">56</a> | Consent MOTION for Extension of Time to <i>Extend Time for Discovery and Case Schedule</i> by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Text of Proposed Order)(McSherry, Corynne) (Entered: 11/24/2014)  |
| 11/24/2014 | <a href="#">57</a> | ORDER regarding <a href="#">41</a> Defendant's Motion to Compel Discovery. See Order for details. Signed by Magistrate Judge Deborah A. Robinson on November 24, 2014. (SRH) (Entered: 11/24/2014)  |
| 11/25/2014 | <a href="#">58</a> | ORDER granting <a href="#">56</a> Consent Motion for Extension of Deadlines. Fact discovery to close by 1/30/2015; Joint status report by 3/2/2015; Close of expert discovery by 7/14/2015; Joint status report by 7/21/2015; Status conference 7/28/2015 (See order for additional deadlines) Signed by Judge Tanya S. Chutkan on 11/25/14. (DJS, ) (Entered: 11/25/2014)  |
| 11/25/2014 |                    | Set/Reset Deadlines/Hearings: Close of Fact Discovery due by 1/30/2015. Joint Status Report due by 3/2/2015. Plaintiff Rule 26(a)(2) due by 3/2/2015. Defendant Rule 26(a)(2) due by 4/13/2015. Rebuttal disclosures due by   |

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|            |                    | 6/1/2015. Reply Disclosures due by 6/15/2015. Close of Expert Discovery due by 7/14/2015. Joint Status Report due by 7/21/2015. Status Conference set for 7/28/2015 at 10:00 AM in Courtroom 2 before Judge Tanya S. Chutkan. (sm) (Entered: 11/25/2014)  |
| 12/01/2014 |                    | Minute Entry for proceedings held before Magistrate Judge Deborah A. Robinson: Status Conference held on 12/1/2014. Further Status Conference set for 1/15/2015 10:00 AM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. Status Report due by 1/12/2015. (Court Reporter Bowles Reporting Services)(FTR Time Frame: 11:13:50 - 1:03:35, Crtrm 4). (zcmm, ) (Entered: 12/01/2014)  |
| 12/01/2014 | <a href="#">59</a> | <p>TRANSCRIPT OF PROCEEDINGS before Magistrate Judge Deborah A. Robinson held on 10/28/2014; Page Numbers: 1-22. Court Reporter/Transcriber Bowles Reporting Service, Telephone number (860) 464-1083, Court Reporter Email Address : brs-ct@sbcglobal.net.</p> <p>For the first 90 days after this filing date, the transcript may be viewed at the courthouse at a public terminal or purchased from the court reporter referenced above. After 90 days, the transcript may be accessed via PACER. Other transcript formats, (multi-page, condensed, CD or ASCII) may be purchased from the court reporter.</p> <p><b>NOTICE RE REDACTION OF TRANSCRIPTS:</b> The parties have twenty-one days to file with the court and the court reporter any request to redact personal identifiers from this transcript. If no such requests are filed, the transcript will be made available to the public via PACER without redaction after 90 days. The policy, which includes the five personal identifiers specifically covered, is located on our website at <a href="http://ww.dcd.uscourts.gov">ww.dcd.uscourts.gov</a>.</p> <p>Redaction Request due 12/22/2014. Redacted Transcript Deadline set for 1/1/2015. Release of Transcript Restriction set for 3/1/2015.(znmw, ) (Entered: 12/01/2014)</p> |
| 12/01/2014 | <a href="#">60</a> | ORDER denying remaining issues with respect to Defendant's Motion to Compel Discovery (Document No. 41). See Order for details. Set/Reset Deadlines/Hearings: Counsel for the parties to the dispute shall file a status report by no later than 1/12/2015; Hearing with respect to the remaining discovery disputes is scheduled for 1/15/2015 at 10:00 AM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. Signed by Magistrate Judge Deborah A. Robinson on December 1, 2014. (SRH) Modified on 12/31/2014 (zcmm, ). (Entered: 12/01/2014)  |
| 12/04/2014 |                    | Minute Entry for proceedings held before Judge Tanya S. Chutkan: Motion Hearing held on 12/4/2014 re <a href="#">34</a> MOTION to Strike Defendant's Jury Demand filed by AMERICAN EDUCATIONAL RESEARCH ASSOCIATION, INC., AMERICAN PSYCHOLOGICAL ASSOCIATION, INC. and NATIONAL COUNCIL ON MEASUREMENT IN EDUCATION, INC. Oral argument heard, and motion taken under advisement.(Court Reporter: Janice Dickman.) (tj) (Entered: 12/04/2014)  |
| 12/18/2014 | <a href="#">61</a> |   |

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|            |                    | TRANSCRIPT OF PROCEEDINGS before Judge Tanya S. Chutkan held on 12-4-14; Page Numbers: 45. Date of Issuance: December 18, 2014. Court Reporter/Transcriber Jan Dickman, Telephone number (202)354-3267, Court Reporter Email Address : JaniceDickmanDCD@gmail.com.<P></P>For the first 90 days after this filing date, the transcript may be viewed at the courthouse at a public terminal or purchased from the court reporter referenced above. After 90 days, the transcript may be accessed via PACER. Other transcript formats, (multi-page, condensed, CD or ASCII) may be purchased from the court reporter.<P> <b>NOTICE RE REDACTION OF TRANSCRIPTS:</b> The parties have twenty-one days to file with the court and the court reporter any request to redact personal identifiers from this transcript. If no such requests are filed, the transcript will be made available to the public via PACER without redaction after 90 days. The policy, which includes the five personal identifiers specifically covered, is located on our website at ww.dcd.uscourts.gov.<P></P>Redaction Request due 1/8/2015. Redacted Transcript Deadline set for 1/18/2015. Release of Transcript Restriction set for 3/18/2015.(Dickman, Janice) (Entered: 12/18/2014) |
| 12/19/2014 | <a href="#">62</a> | NOTICE OF WITHDRAWAL OF APPEARANCE as to AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.. Attorney Michael Andrew Zee terminated. (Zee, Michael) (Entered: 12/19/2014)  |
| 12/24/2014 | <a href="#">63</a> | ENTERED IN ERROR.....Consent MOTION for Extension of Time to <i>Oppose Plaintiffs' Motion to Compel</i> by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Text of Proposed Order)(Bridges, Andrew) Modified on 12/24/2014 (rdj). (Entered: 12/24/2014)  |
| 12/24/2014 |                    | NOTICE OF CORRECTED DOCKET ENTRY: re <a href="#">63</a> Consent MOTION for Extension of Time to <i>Oppose Plaintiffs' Motion to Compel</i> was entered in error at the request of counsels. (rdj) (Entered: 12/24/2014)  |
| 12/24/2014 | <a href="#">64</a> | First MOTION to Compel <i>Public Resource.Org, Inc.</i> by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Rehn, Nathan) (Entered: 12/24/2014)   |
| 12/24/2014 | <a href="#">65</a> | Proposed Order re <a href="#">64</a> <i>Plaintiffs' Motion to Compel</i> by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Rehn, Nathan) Modified on 12/28/2014 (jf, ). (Entered: 12/24/2014)   |
| 12/24/2014 | <a href="#">66</a> | Declaration re <a href="#">64</a> First MOTION to Compel <i>Public.Resource.Org.</i> /by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Rehn, Nathan) Modified on 12/28/2014 (jf, ). (Entered: 12/24/2014)  |
| 01/12/2015 | <a href="#">67</a> | Memorandum in opposition to re <a href="#">64</a> First MOTION to Compel <i>Public Resource.Org, Inc.</i> <i>Discovery</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Declaration of Kathleen Lu In Support of Defendant-Counterclaimant Public.Resource.Org, Inc.'s Opposition to Plaintiff-Counterdefendant American Society for Testing and Materials d/b/a ASTM International Motion to Compel Discovery, # <a href="#">2</a> Declaration of John Doe In Support of Defendant-Counterclaimant Public.Resource.Org, Inc.'s Response to Plaintiffs' Motion to Compel Discovery, # <a href="#">3</a> Declaration of Carl Malamud In Support of Defendant-Counterclaimant Public.Resource.Org, Inc.'s Response  |

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|            |                    | to Plaintiffs' Motion to Compel Discovery)(Bridges, Andrew) (Entered: 01/12/2015)   |
| 01/12/2015 | <a href="#">68</a> | STATUS REPORT <i>ON OUTSTANDING ISSUES RAISED IN PUBLIC RESOURCE'S MOTION TO COMPEL DISCOVERY (Related Dkt. # <a href="#">60</a>)</i> by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) (Entered: 01/12/2015)   |
| 01/14/2015 |                    | MINUTE ORDER: At a hearing conducted by this court on December 1, 2014, this court, inter alia, directed the parties to the discovery disputes which were pending at that time to continue to meet and confer in an effort to finalize the resolution of those disputes; to file a status report by no later than January 12, 2015; and to appear for a status hearing on January 15, 2015. See Order (Document No. 60). This court, in an effort to prepare for the January 15 hearing has determined that (1) in the interim, Plaintiffs filed a Motion to Compel Discovery (Document No. 64), and that the motion is not yet ripe, and (2) the parties have not yet completed their efforts to resolve the discovery disputes which were pending as of December 1, 2014 (see Document No. 68). For these reasons, it is ORDERED that the hearing now scheduled for January 15 is continued to 10:00 a.m. on Wednesday, February 4, 2015. It is FURTHER ORDERED that counsel shall continue to meet and confer regarding the discovery disputes which are the subject of both the pending motion and the status report, and shall jointly file a status report by no later than January 20, 2015. Set/Reset Deadlines/Hearings: Counsel for the parties to the discovery disputes shall jointly file a status report by no later than January 20, 2015. A Status Conference is scheduled for 10:00 a.m. on February 4, 2015 in Courtroom 4 before Magistrate Judge Deborah A. Robinson. Signed by Magistrate Judge Deborah A. Robinson on January 14, 2015. (SRH) (Entered: 01/14/2015) |
| 01/20/2015 | <a href="#">69</a> | STATUS REPORT <i>Joint Status Report and [Proposed] Order On Defendant and Plaintiffs' Motions to Compel Discovery</i> by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Rehn, Nathan) (Entered: 01/20/2015)  |
| 01/22/2015 | <a href="#">70</a> | REPLY to opposition to motion re <a href="#">64</a> First MOTION to Compel <i>Public Resource.Org, Inc.</i> filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Rehn, Nathan) (Entered: 01/22/2015)   |
| 01/29/2015 | <a href="#">71</a> | MOTION for Extension of Time to Complete Discovery <i>Defendant-Counterclaimant Public.Resource.Org, Inc.'s Motion for Extension of Discovery Period, Corresponding Modification of Scheduling Order, and Leave to Take More Than 10 Depositions</i> by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Declaration Declaration of Kathleen Lu in Support of Defendant-Counterclaimant Public.Resource.Org, Inc.'s Motion for Extension of Discovery Period, Corresponding Modification of Scheduling Order, and Leave to Take More Than 10 Depositions, # <a href="#">2</a> Text of Proposed Order [Proposed] Order Granting Defendant's Motion for Extension of Discovery Period, Corresponding Modification of Scheduling Order, and Leave to Take More Than 10 Depositions)(Bridges, Andrew) (Entered: 01/29/2015)  |
| 02/02/2015 | <a href="#">72</a> | MEMORANDUM AND OPINION. Signed by Judge Tanya S. Chutkan on 2/2/2015. (lctsc2) (Entered: 02/02/2015)  |
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| 02/02/2015 | <a href="#">73</a> | ORDER granting <a href="#">34</a> Motion to Strike. The jury demand in Defendant's <a href="#">21</a> counterclaim and Answer is stricken. Signed by Judge Tanya S. Chutkan on 2/2/2015. (lctsc2) (Entered: 02/02/2015)  |
| 02/03/2015 | <a href="#">74</a> | MOTION to Amend/Correct <a href="#">1</a> Complaint,, <i>Exhibit B</i> by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Exhibit Amended Exhibit B to Complaint, # <a href="#">2</a> Text of Proposed Order [Proposed] Order Granting Motion to Amend)(Rehn, Nathan) (Entered: 02/03/2015)   |
| 02/04/2015 | <a href="#">75</a> | NOTICE of Appearance by Simeon Meir Schopf on behalf of AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Schopf, Simeon) (Entered: 02/04/2015)  |
| 02/04/2015 |                    | MINUTE ORDER. Proceedings held before Magistrate Judge Deborah A. Robinson: Further Status Conference held on 2/4/2015. With respect to <a href="#">64</a> Plaintiffs' Motion to Compel Discovery, the defendant may redact identifying information from the documents (see page 3 in document number <a href="#">69</a> ); and, that such redactions are without prejudice to raising the issue at a time there is a more specific factual showing of need. In all other respects, the Motion is DENIED AS MOOT. Status Conference set for 3/25/2015 10:00 AM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. (Court Reporter Bowles Reporting Services)(FTR Time Frame: 10:09:09 - 10:42:39, Crtrm 4) (zcmm, ) (Entered: 02/04/2015) |
| 02/17/2015 | <a href="#">76</a> | Memorandum in opposition to re <a href="#">71</a> MOTION for Extension of Time to Complete Discovery <i>Defendant-Counterclaimant Public.Resource.Org, Inc.'s Motion for Extension of Discovery Period, Corresponding Modification of Scheduling Order, and Leave to Take More Than 10 Depositions</i> filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Rehn, Nathan) (Entered: 02/17/2015)   |
| 02/20/2015 | <a href="#">77</a> | STIPULATION re <a href="#">44</a> Stipulation and Order <i>JOINT STIPULATION TO AMEND PROTECTIVE ORDER</i> by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) (Entered: 02/20/2015)   |
| 02/20/2015 | <a href="#">78</a> | WITHDRAWAL OF MOTION PURSUANT TO <a href="#">80</a> . . . . MOTION for Protective Order by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Declaration of Andrew P. Bridges In Support of Public.Resource.Org, Inc.'s Motion for Protective Order, # <a href="#">2</a> Exhibit A - Plaintiffs' Second Requests for Production of Documents, Things and Electronically Stored Information, # <a href="#">3</a> Text of Proposed Order Granting Defendant's Motion for Protective Order [Dkt. 78])(Bridges, Andrew) Modified on 3/2/2015 (td, ). (Entered: 02/20/2015)   |
| 02/20/2015 | <a href="#">79</a> | Memorandum in opposition to re <a href="#">74</a> MOTION to Amend/Correct <a href="#">1</a> Complaint,, <i>Exhibit B</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Declaration of Andrew P. Bridges In Support of Public.Resource.Org, Inc.'s Opposition to National Fire Protection Association, Inc.'s Motion to Amend Complaint, # <a href="#">2</a> Exhibit A to Bridges Declaration In Support of Opposition to Motion to Amend Complaint, # <a href="#">3</a> Text of Proposed Order Denying National Fire Protection Association, Inc.'s Motion to Amend Complaint (Dkt. No. 74))(Bridges, Andrew) (Entered: 02/20/2015)  |

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| 02/26/2015 | <a href="#">80</a> | WITHDRAWAL of Motion by PUBLIC.RESOURCE.ORG, INC. re <a href="#">78</a> MOTION for Protective Order filed by PUBLIC.RESOURCE.ORG, INC. . (Bridges, Andrew) (Entered: 02/26/2015)  |
| 02/27/2015 | <a href="#">81</a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> Text of Proposed Order Granting Defendant's Motion to File Documents Under Seal, # <a href="#">2</a> CONFIDENTIAL Version of Public.Resource.Org, Inc.s Reply In Support Of Motion For Extension Of Discovery Period, Corresponding Modification Of Scheduling Order, And Leave To Take More Than Ten Depositions, # <a href="#">3</a> CONFIDENTIAL Version of Reply Declaration of Andrew P. Bridges In Support of Defendant-Counterclaimant Public.Resource.Org, Inc.s Reply In Support Of Motion For Extension Of Discovery Period, Corresponding Modification Of Scheduling Order, And Leave To Take More Than Ten Depositions, # <a href="#">4</a> Confidential Exhibit D to the Bridges Reply Declaration In Support, # <a href="#">5</a> Confidential Exhibit E to the Bridges Reply Declaration In Support, # <a href="#">6</a> Confidential Exhibit F to the Bridges Reply Declaration In Support)(Bridges, Andrew) (Entered: 02/27/2015)   |
| 02/27/2015 | <a href="#">82</a> | REPLY to opposition to motion re <a href="#">71</a> MOTION for Extension of Time to Complete Discovery <i>Defendant-Counterclaimant Public.Resource.Org, Inc.'s Motion for Extension of Discovery Period, Corresponding Modification of Scheduling Order, and Leave to Take More Than 10 Depositions [PUBLIC REDACTED VERSION]</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> PUBLIC REDACTED VERSION of Reply Declaration of Andrew P. Bridges In Support of Defendant-Counterclaimant Public.Resource.Org, Inc.s Reply In Support of Motion for Extension of Discovery Period, Corresponding Modification of Scheduling Order, and Leave to Take More Than 10 Depositions, # <a href="#">2</a> Exhibit A to Bridges Reply Declaration In Support, # <a href="#">3</a> Exhibit B to Bridges Reply Declaration In Support, # <a href="#">4</a> Exhibit C to Bridges Reply Declaration In Support, # <a href="#">5</a> Exhibit D to Bridges Reply Declaration In Support, # <a href="#">6</a> Exhibit E to Bridges Reply Declaration In Support, # <a href="#">7</a> Exhibit F to Bridges Reply Declaration In Support) (Bridges, Andrew) (Entered: 02/27/2015) |
| 02/28/2015 | <a href="#">83</a> | CERTIFICATE OF SERVICE by PUBLIC.RESOURCE.ORG, INC. re <a href="#">81</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) . (Bridges, Andrew) (Entered: 02/28/2015)  |
| 03/02/2015 | <a href="#">84</a> | REPLY to opposition to motion re <a href="#">74</a> MOTION to Amend/Correct <a href="#">1</a> Complaint,, <i>Exhibit B</i> filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Rehn, Nathan) (Entered: 03/02/2015)  |
| 03/02/2015 | <a href="#">85</a> | STATUS REPORT <i>Joint Status Report In Response to Scheduling Order (Dkt. 58)</i> by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) (Entered: 03/02/2015)  |
| 03/03/2015 |                    | DISREGARD THIS NOTICE. . . NOTICE OF ERROR re <a href="#">85</a> Status Report; emailed to abridges@fenwick.com, cc'd 31 associated attorneys -- The PDF  |

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|            |                    | file you docketed contained errors: 1. FYI: On future filings, the document must be signed by counsel who is electronically filing the doc. (td, ) Modified on 3/3/2015 (td, ). (Entered: 03/03/2015)  |
| 03/06/2015 | <a href="#">86</a> | Emergency MOTION for Order <i>and Request for Expedited Briefing Schedule</i> by AMERICAN SOCIETY FOR TESTING AND MATERIALS (Attachments: # <a href="#">1</a> Exhibit Exhibit A, # <a href="#">2</a> Exhibit Exhibit B, # <a href="#">3</a> Exhibit Exhibit C, # <a href="#">4</a> Exhibit Exhibit D, # <a href="#">5</a> Exhibit Exhibit E, # <a href="#">6</a> Exhibit Exhibit F, # <a href="#">7</a> Exhibit Exhibit G)(Fee, J.) (Entered: 03/06/2015)  |
| 03/09/2015 |                    | Set/Reset Hearings: Status Conference, including consideration of <a href="#">71</a> scheduled for 3/19/2015 at 02:00 PM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. All counsel shall meet and confer in advance of said hearing in an effort to reach a consensus regarding the expeditious completion of discovery. (lcdar2) (Entered: 03/09/2015)  |
| 03/09/2015 |                    | MINUTE ORDER: It is hereby ORDERED that <a href="#">81</a> Sealed Motion for Leave to File Document Under Seal is hereby GRANTED. Signed by Magistrate Judge Deborah A. Robinson on March 9, 2015. (lcdar2) (Entered: 03/09/2015)  |
| 03/09/2015 | <a href="#">87</a> | SEALED REPLY TO OPPOSITION filed by PUBLIC.RESOURCE.ORG, INC. re <a href="#">71</a> MOTION for Extension of Time to Complete Discovery <i>Defendant-Counterclaimant Public.Resource.Org, Inc.'s Motion for Extension of Discovery Period, Corresponding Modification of Scheduling Order, and Leave to Take More Than 10 Depositions</i> (Attachments: # <a href="#">1</a> Exhibit D, # <a href="#">2</a> Exhibit E, # <a href="#">3</a> Exhibit F)(ztd, ) (Entered: 03/10/2015)   |
| 03/17/2015 | <a href="#">88</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Jason Blake Cunningham, :Firm- King & Spalding LLP, :Address- 101 Second Street, Suite 2300, San Francisco, CA 94105. Phone No. - (415) 318-1200. Fax No. - (415) 318-1300 Filing fee \$ 100, receipt number 0090-4024895. Fee Status: Fee Paid. by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Attachments: # <a href="#">1</a> Declaration, # <a href="#">2</a> Text of Proposed Order)(Bucholtz, Jeffrey) (Entered: 03/17/2015) |
| 03/17/2015 | <a href="#">89</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Antonio E. Lewis, :Firm- King & Spalding LLP, :Address- 100 N Tryon Street, Suite 3900, Charlotte, NC 28202. Phone No. - (704) 503-2600. Fax No. - (704) 503-2622 Filing fee \$ 100, receipt number 0090-4024904. Fee Status: Fee Paid. by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Attachments: # <a href="#">1</a> Declaration, # <a href="#">2</a> Text of Proposed Order)(Bucholtz, Jeffrey) (Entered: 03/17/2015)          |
| 03/18/2015 |                    | MINUTE ORDER: Granting <a href="#">88</a> Motion for Leave to Appear Pro Hac Vice. Attorney Jason Blake Cunningham is hereby admitted pro hac vice to appear in this matter on behalf of defendant AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.Signed by Judge Tanya S. Chutkan on 3/18/15. (DJS) Modified on 3/18/2015 (sm). (Entered: 03/18/2015)  |
| 03/19/2015 |                    |  |

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|            |                    | Minute Entry for proceedings held before Magistrate Judge Deborah A. Robinson: Status Conference held on 3/19/2015. (Court Reporter: Lisa Moreira) (zcmm, ) (Entered: 03/20/2015)   |
| 03/23/2015 |                    | MINUTE ORDER: Proceedings held before Magistrate Judge Deborah A. Robinson: Status hearing and hearing with respect to Defendants Motion for Extension of Time to Complete Discovery, Document No. <a href="#">71</a> , conducted on March 19, 2015. Defendants Motion for Extension of Time to Complete Discovery DENIED for the reasons set forth in the record, except that Defendant may complete Rule 30(b)(6) depositions in accordance with the agreement of the parties by no later than April 2, 2015. Parties waive oral argument with respect to Plaintiffs Emergency Motion for Protective Order Document No. 86, which will be decided by the Court after said motion has been fully briefed. (lcdar1) (Entered: 03/23/2015)   |
| 03/23/2015 |                    | MINUTE ORDER granting <a href="#">89</a> Motion for Leave to Appear Pro Hac Vice. Signed by Magistrate Judge Deborah A. Robinson on 03/23/2015. (lcdar1, ) (Entered: 03/23/2015)  |
| 03/23/2015 | <a href="#">90</a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> Text of Proposed Order Granting Defendant's Motion to File Documents Under Seal, # <a href="#">2</a> Sealed Declaration of Andrew P. Bridges In Support of Public.Resource.Org, Inc.'s Opposition to Plaintiffs' Emergency Motion for Protective Order and Request for Expedited Briefing Schedule, # <a href="#">3</a> Sealed Exhibit 11 to Bridges Declaration, # <a href="#">4</a> Sealed Exhibit 12 to Bridges Declaration, # <a href="#">5</a> Sealed Exhibit 13 to Bridges Declaration, # <a href="#">6</a> Sealed Exhibit 14 to Bridges Declaration, # <a href="#">7</a> Sealed Exhibit 15 to Bridges Declaration, # <a href="#">8</a> Sealed Exhibit 16 to Bridges Declaration) (Bridges, Andrew) (Entered: 03/23/2015)  |
| 03/23/2015 | <a href="#">91</a> | Memorandum in opposition to re <a href="#">86</a> Emergency MOTION for Order <i>and Request for Expedited Briefing Schedule</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> [Public] Declaration of Andrew P. Bridges In Support of Public.Resource.Org, Inc.'s Opposition to Plaintiffs' Emergency Motion for Protective Order and Request for Expedited Briefing Schedule, # <a href="#">2</a> Exhibit 1 to Bridges Declaration, # <a href="#">3</a> Exhibit 2 to Bridges Declaration, # <a href="#">4</a> Exhibit 3 to Bridges Declaration, # <a href="#">5</a> Exhibit 4 to Bridges Declaration, # <a href="#">6</a> Exhibit 5 to Bridges Declaration, # <a href="#">7</a> Exhibit 6 to Bridges Declaration, # <a href="#">8</a> Exhibit 7 to Bridges Declaration, # <a href="#">9</a> Exhibit 8 to Bridges Declaration, # <a href="#">10</a> Exhibit 9 to Bridges Declaration, # <a href="#">11</a> Exhibit 10 to Bridges Declaration, # <a href="#">12</a> Exhibit 11 to Bridges Declaration, # <a href="#">13</a> Exhibit 12 to Bridges Declaration, # <a href="#">14</a> Exhibit 13 to Bridges Declaration, # <a href="#">15</a> Exhibit 14 to Bridges Declaration, # <a href="#">16</a> Exhibit 15 to Bridges Declaration, # <a href="#">17</a> Exhibit 16 to Bridges Declaration, # <a href="#">18</a> Text of Proposed Order Denying Plaintiffs' Emergency Motion for Protective Order and Request for Expedited Briefing Schedule)(Bridges, Andrew) (Entered: 03/23/2015) |
| 03/24/2015 | <a href="#">92</a> | CERTIFICATE OF SERVICE by PUBLIC.RESOURCE.ORG, INC. re <a href="#">90</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and   |

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|            |                    | only available to authorized persons.) . (Bridges, Andrew) (Entered: 03/24/2015)   |
| 03/24/2015 |                    | MINUTE ORDER: It is hereby ORDERED that Sealed Motion for Leave to File Document Under Seal, Document No. <a href="#">90</a> , is hereby GRANTED. Signed by Magistrate Judge Deborah A. Robinson on 03/24/2015. (lcdar1, ) (Entered: 03/24/2015)   |
| 03/24/2015 | <a href="#">93</a> | SEALED DOCUMENT filed by PUBLIC.RESOURCE.ORG, INC.. re <a href="#">91</a> Memorandum in Opposition,,,, filed by PUBLIC.RESOURCE.ORG, INC.. (This document is SEALED and only available to authorized persons.)(ztd, ) (Entered: 03/24/2015)  |
| 03/26/2015 | <a href="#">94</a> | <p>TRANSCRIPT OF PROCEEDINGS before Magistrate Judge Deborah A. Robinson held on March 19, 2015; Page Numbers: 1-60. Date of Issuance:March 26, 2015. Court Reporter/Transcriber Lisa A. Moreira, RDR, CRR, Telephone number 202-354-3187, Court Reporter Email Address : Lisa_Moreira@dcd.uscourts.gov.</p> <p>For the first 90 days after this filing date, the transcript may be viewed at the courthouse at a public terminal or purchased from the court reporter referenced above. After 90 days, the transcript may be accessed via PACER. Other transcript formats, (multi-page, condensed, CD or ASCII) may be purchased from the court reporter.</p> <p><b>NOTICE RE REDACTION OF TRANSCRIPTS:</b> The parties have twenty-one days to file with the court and the court reporter any request to redact personal identifiers from this transcript. If no such requests are filed, the transcript will be made available to the public via PACER without redaction after 90 days. The policy, which includes the five personal identifiers specifically covered, is located on our website at www.dcd.uscourts.gov.</p> <p>Redaction Request due 4/16/2015. Redacted Transcript Deadline set for 4/26/2015. Release of Transcript Restriction set for 6/24/2015.(Moreira, Lisa) (Entered: 03/26/2015)</p> |
| 04/01/2015 | <a href="#">95</a> | ORDER granting NFPA's <a href="#">74</a> Motion to Amend the Complaint. See Order for details. Signed by Judge Tanya S. Chutkan on 4/1/2015. (lctsc2) (Entered: 04/01/2015)  |
| 04/01/2015 | <a href="#">96</a> | SUPPLEMENT (Exhibit B) to re <a href="#">1</a> Complaint,, filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (td, ) (Entered: 04/02/2015)   |
| 04/02/2015 | <a href="#">97</a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> Text of Proposed Order Granting Plaintiffs' Motion to File Documents Under Seal, # <a href="#">2</a> Exhibit Sealed Exhibit 2 to Rubel Declaration, # <a href="#">3</a> Exhibit Sealed Exhibit 6 to Rubel Declaration)(Fee, J.) (Entered: 04/02/2015)  |
| 04/02/2015 | <a href="#">98</a> | REPLY to Opposition re <a href="#">86</a> MOTION for Protective Order filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS. (Attachments: #   |

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Document #1715850

Filed: 01/31/2018

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|            |                     | <a href="#">1</a> Declaration of Jordana S. Rubel, # <a href="#">2</a> Exhibit 1, # <a href="#">3</a> Exhibit 2 [UNDER SEAL], # <a href="#">4</a> Exhibit 3, # <a href="#">5</a> Exhibit 4, # <a href="#">6</a> Exhibit 5, # <a href="#">7</a> Exhibit 6 [UNDER SEAL])(Fee, J.) Modified event title on 4/3/2015 (znmw, ). (Entered: 04/02/2015)  |
| 04/21/2015 |                     | MINUTE ORDER: Sealed Motion for Leave to File Document Under Seal <a href="#">97</a> is hereby GRANTED. Signed by Magistrate Judge Deborah A. Robinson on 4/21/2015.(lcdar1, ) (Entered: 04/21/2015)  |
| 04/21/2015 | <a href="#">99</a>  | SEALED DOCUMENT filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS. re Order on Sealed Motion for Leave to File Document Under Seal. (This document is SEALED and only available to authorized persons.)(ztd, ) (Entered: 04/22/2015)  |
| 04/23/2015 | <a href="#">100</a> | STRICKEN PURSUANT TO MINUTE ORDER FILED ON 06/10/2015.....MOTION for Order <i>to Set Expert Schedule</i> by AMERICAN SOCIETY FOR TESTING AND MATERIALS (Attachments: # <a href="#">1</a> Exhibit Proposed Order Granting Plaintiffs' Motion to Set Expert Schedule)(Fee, J.) Modified on 6/11/2015 (jf). (Entered: 04/23/2015)  |
| 05/11/2015 | <a href="#">101</a> | Memorandum in opposition to re <a href="#">100</a> MOTION for Order <i>to Set Expert Schedule</i> filed by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) (Entered: 05/11/2015)   |
| 05/21/2015 | <a href="#">102</a> | REPLY to opposition to motion re <a href="#">100</a> MOTION for Order <i>to Set Expert Schedule</i> filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Attachments: # <a href="#">1</a> Exhibit Exhibit A)(Rehn, Nathan) (Entered: 05/21/2015)   |
| 06/10/2015 |                     | MINUTE ORDER: Plaintiffs' Motion to Set Expert Schedule (Document No. <a href="#">100</a> ) is pending for determination by this court. Entirely absent from the motion, and from the opposition to the motion and the reply to the opposition, is any indication that the parties discharged their duty to confer in an effort to agree upon a schedule, and if not, at least to narrow the areas of disagreement. See LCvR 7(m). This court has previously cautioned counsel that every disagreement regarding the conduct of discovery ought not spawn a new wave of litigation; this concern is particularly true where, as here, the disagreement concerns the schedule for completion of discovery. It is, therefore, ORDERED that the motion is STRICKEN FROM THE RECORD. It is FURTHER ORDERED that counsel for the parties shall meet and confer regarding the schedule for completion of discovery, and, by no later than June 24, 2015, file as attachments to a notice of filing their proposed orders. Signed by Magistrate Judge Deborah A. Robinson on 6/10/2015. (lcdar1, ) (Entered: 06/10/2015) |
| 06/16/2015 |                     | Set/Reset Deadlines : The parties' Notice of Filing with attached proposed orders regarding the schedule for completion of discovery to be filed by 6/24/15. (kk) (Entered: 06/16/2015)   |
| 06/22/2015 | <a href="#">103</a> | ORDER denying Plaintiffs' Motion for Protective Order and Request for Expedited Briefing Schedule (Document No. <a href="#">86</a> ). Signed by Magistrate Judge Deborah A. Robinson on 6/22/2015. (lcdar1, ) (Entered: 06/22/2015)   |
| 06/24/2015 | <a href="#">104</a> | NOTICE of Proposed Order <i>to Set Schedule for Expert Discovery</i> by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a>  |

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|            |                     | Text of Proposed Order [Proposed] Order Setting Schedule for Expert Discovery, # <a href="#">2</a> Exhibit Exhibit A to Notice of Filing, # <a href="#">3</a> Exhibit Exhibit B to Notice of Filing)(Rehn, Nathan) (Entered: 06/24/2015)  |
| 06/24/2015 | <a href="#">105</a> | NOTICE of Proposed Order <i>Regarding the Schedule for Completion of Discovery</i> by PUBLIC.RESOURCE.ORG, INC. re Set/Reset Deadlines (Attachments: # <a href="#">1</a> Text of Proposed Order Regarding the Schedule for Completion of Discovery)(Bridges, Andrew) (Entered: 06/24/2015)  |
| 06/25/2015 |                     | NOTICE OF ERROR re <a href="#">104</a> Notice of Proposed Order; emailed to thane.rehn@mto.com, cc'd 35 associated attorneys -- The PDF file you docketed contained errors: 1. FYI: On future filings, if you are filing the document your name must be on the signature line(s). (td, ) (Entered: 06/25/2015)  |
| 06/29/2015 |                     | Set/Reset Deadlines : Rule 30(b)(6) depositions to be completed by 7/7/15. (kk) (Entered: 06/29/2015)   |
| 07/01/2015 | <a href="#">106</a> | STIPULATION <i>Joint Stipulation and Proposed Order Regarding Scheduling of Certain Depositions</i> by PUBLIC.RESOURCE.ORG, INC.. (Becker, Matthew) (Entered: 07/01/2015)   |
| 07/09/2015 |                     | MINUTE ORDER: Upon consideration of the Joint Stipulation and Proposed Order Regarding Scheduling of Certain Depositions (Document No. <a href="#">106</a> ) it is hereby ORDERED that the deadline for the deposition of ASTM's 30(b)(6) corporate representative is extended to July 24, 2015. It is further ORDERED that the deposition of Public Resource's expert witness shall take place on or by July 31, 2015. It is further ORDERED that a status hearing is scheduled for 2:00 p.m. on Wednesday 8/12/15. Signed by Magistrate Judge Deborah A. Robinson on 7/9/2015. (lcdar1, ) (Entered: 07/09/2015) |
| 07/09/2015 |                     | Set/Reset Hearings: Status Conference is hereby set for 8/12/2015 at 02:00 PM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. (lcdar1, ) (Entered: 07/09/2015)  |
| 07/09/2015 |                     | MINUTE ORDER: The status conference previously set for 7/28/15 before Judge CHUTKAN is hereby vacated. Signed by Judge Tanya S. Chutkan on 7/9/15. (DJS) (Entered: 07/09/2015)  |
| 07/21/2015 | <a href="#">107</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Katherine E. Merk, :Firm- King & Spalding LLP, :Address- 101 Second Street, Ste. 2300, San Francisco, CA 94105. Phone No. - 415-318-1200. Fax No. - 415-318-1300 Filing fee \$ 100, receipt number 0090-4182854. Fee Status: Fee Paid. by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Attachments: # <a href="#">1</a> Exhibit 1, # <a href="#">2</a> Text of Proposed Order)(Bucholtz, Jeffrey) (Entered: 07/21/2015)  |
| 07/23/2015 |                     | MINUTE ORDER: Granting <a href="#">107</a> Motion for Leave to Appear Pro Hac Vice. Attorney Katherine E. Merk is hereby admitted pro hac vice to appear in this matter on behalf of Plaintiff AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.Signed by Judge Tanya S. Chutkan on 7/22/15. (DJS) (Entered: 07/23/2015)   |
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| 07/29/2015 |                     | MINUTE ORDER: It is hereby ORDERED that not later than August 5, 2015 all counsel of record shall verify that the docket in this action contains the attorney's email address. In the absence of an email address, the attorney(s) shall obtain an ECF password or file a notice informing the court that that they do not wish to obtain a password. Should counsel decline to obtain an ECF password, they shall forfeit their right to: (1) file electronically in this action; and (2) receive copies of court orders via U.S. mail. Signed by Judge Tanya S. Chutkan on 7/29/15. (DJS) (Entered: 07/29/2015) |
| 07/29/2015 |                     | Set/Reset Deadlines: Notice due by 8/5/2015. (zsm) (Entered: 07/29/2015)  |
| 08/05/2015 | <a href="#">108</a> | NOTICE <i>Verification of Email Addresses for Counsel of Record Pursuant to July 29, 2015 Minute Order</i> by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Rehn, Nathan) (Entered: 08/05/2015)   |
| 08/05/2015 | <a href="#">109</a> | NOTICE <i>Verification of Email Addresses for Counsel of Record Pursuant to July 29, 2015 Minute Order</i> by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Cunningham, Jason) (Entered: 08/05/2015)  |
| 08/05/2015 | <a href="#">110</a> | NOTICE AND VERIFICATION OF MATTHEW BECKER REGARDING EMAIL ADDRESSES FOR COUNSEL OF RECORD PURSUANT TO COURT'S MINUTE ORDER OF JULY 29, 2015 by PUBLIC.RESOURCE.ORG, INC. re Set/Reset Deadlines, Order,, (Becker, Matthew) (Entered: 08/05/2015)  |
| 08/12/2015 |                     | Minute Entry for proceedings held before Magistrate Judge Deborah A. Robinson : Status Hearing conducted on 8/12/2015. Court Reporter FTR Gold - Ctrm. 4. FTR Time Frame: [2:20:37-3:15:13]. (mr) (Entered: 08/12/2015)   |
| 08/12/2015 | <a href="#">111</a> | ORDER on Status Hearing conducted on August 12, 2015. Signed by Magistrate Judge Deborah A. Robinson on 8/12/2015. (lcdar1, ) Modified on 8/12/2015 (lcdar1, ). (Entered: 08/12/2015)   |
| 08/12/2015 |                     | Set/Reset Deadlines: Fact discovery has closed. Expert discovery shall close on 10/16/2015. (lcdar1, ) (Entered: 08/12/2015)  |
| 08/12/2015 |                     | Set/Reset Deadlines: Defendant/Counterclaimant motion in limine due by 8/19/2015. Defendant/Counterclaimant rebuttal expert report due by 9/11/2015. Plaintiff/Counterdefendants replies due by 10/2/2015. (mr) (Entered: 08/13/2015)   |
| 09/29/2015 |                     | Set/Reset Hearings: Post-Discovery Status Conference is hereby set for 10/20/2015 at 04:00 PM in Courtroom 4 before Magistrate Judge Deborah A. Robinson. (lcdar1, ) (Entered: 09/29/2015)  |
| 10/14/2015 | <a href="#">112</a> | Consent MOTION for Order <i>Request for Telephonic Status Conference</i> by PUBLIC.RESOURCE.ORG, INC. (Becker, Matthew) (Entered: 10/14/2015)   |
| 10/15/2015 |                     | MINUTE ORDER: Consent motion for a telephonic status conference, Document No. <a href="#">112</a> , is hereby GRANTED. Signed by Magistrate Judge Deborah A. Robinson on 10/15/2015. (lcdar1, ) (Entered: 10/15/2015)   |
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|            |                     | Minute Entry for proceedings held before Magistrate Judge Deborah A. Robinson: Post-Discovery Status Conference conducted on 10/20/2015. All Counsel confirm that discovery - both fact and expert - has been completed. Court Reporter FTR Gold - Ctrm. 4. (FTR Time Frame: 4:02:59-4:10:33). Plaintiffs' Counsel: Jordana Rubel, Kevin Fee, Nathan Rehn, Kelly Klaus, and Blake Cunningham; Defendant's Counsel: Matthew Becker. (mr) (Entered: 10/20/2015)  |
| 10/27/2015 | <a href="#">113</a> | NOTICE of Request for Hearing by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Rubel, Jordana) (Entered: 10/27/2015)   |
| 10/27/2015 |                     | MINUTE ORDER. A status conference will be held in both this case and American Educational Research Association, Inc. v. Public.Resource.Org, Inc., Civil Action No. 1:14-cv-00857-TSC on Wednesday, November 4, 2015 at 10:15am. The court intends to set schedules for briefing summary judgment motions in both cases at the status conference. The parties to this case are hereby directed to jointly file their proposed schedules for summary judgment briefing, accompanied by proposed orders, by Friday, October 30, 2015. Signed by Judge Tanya S. Chutkan on 10/27/15. (lctsc2) (Entered: 10/27/2015)                           |
| 10/28/2015 |                     | Set/Reset Deadlines/Hearings: Proposed Briefing Schedule due by 10/30/2015. Status Conference set for 11/4/2015 at 10:15 AM in Courtroom 2 before Judge Tanya S. Chutkan. (zsm) (Entered: 10/28/2015)  |
| 10/30/2015 | <a href="#">114</a> | PROPOSED BRIEFING SCHEDULE re Order,, and Joint Report of the Parties, submitted by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Exhibit A - Plaintiffs' Proposed Order, # <a href="#">2</a> Exhibit B - Defendant's Proposed Order)(Becker, Matthew) (Entered: 10/30/2015)  |
| 11/04/2015 |                     | Minute Entry for proceedings held before Judge Tanya S. Chutkan: Status Conference held on 11/4/2015. Order to issue. Motion Hearing set for 3/22/2016 at 9:30 AM in Courtroom 2 before Judge Tanya S. Chutkan. (Court Reporter Bryan Wayne.) (zsm) (Entered: 11/04/2015)  |
| 11/04/2015 |                     | MINUTE ORDER setting briefing schedule: Plaintiffs' Motion for Summary Judgment due by November 19, 2015; Defendant's Opposition to Plaintiffs' Motion for Summary Judgment and COMBINED Cross-Motion for Summary Judgment due by December 21, 2015; Plaintiffs' Reply in Support of their Motion for Summary Judgment and COMBINED Opposition to Defendant's Cross-Motion for Summary Judgment due by January 21, 2016; Defendant's Reply in Support of its Cross-Motion for Summary Judgment due by February 4, 2016; Amicus briefs due by January 11, 2016. Signed by Judge Tanya S. Chutkan on 11/4/15. (lctsc2) (Entered: 11/04/2015) |
| 11/04/2015 |                     | ENTERED IN ERROR.....MINUTE ORDER setting briefing schedule: Plaintiffs' Motion for Summary Judgment due by December 21, 2015; Defendant's Opposition to Plaintiffs' Motion for Summary Judgment and COMBINED Cross-Motion for Summary Judgment due by January 21, 2016; Plaintiffs' Reply in Support of their Motion for Summary Judgment and   |

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|            |                     | COMBINED Opposition to Defendant's Cross-Motion for Summary Judgment due by February 18, 2016; Defendant's Reply in Support of its Cross-Motion for Summary Judgment due by March 3, 2016; Amicus briefs due by February 11, 2016. Signed by Judge Tanya S. Chutkan on 11/4/15. (lctsc2) Modified on 11/4/2015 (zsm). (Entered: 11/04/2015)   |
| 11/04/2015 |                     | Set/Reset Deadlines: Summary Judgment motions due by 11/19/2015. Response to Motion for Summary Judgment due by 12/21/2015. Reply to Motion for Summary Judgment due by 1/21/2016.Replies due by 2/4/2016. Brief due by 1/11/2016. (zsm) (Entered: 11/04/2015)  |
| 11/05/2015 | 115                 | ENTERED IN ERROR.....MINUTE ORDER: Due to an unexpected scheduling conflict, the motion hearing previously set for 3/22/2016 is hereby VACATED. A new date will be set at a later time. Signed by Judge Tanya S. Chutkan on 11/5/15. (DJS) Modified on 11/5/2015 (zsm). (Entered: 11/05/2015)   |
| 11/05/2015 |                     | MINUTE ORDER: Due to an unexpected scheduling conflict, the motion hearing previously set for 3/22/2016 is hereby VACATED. A new date will be set at a later time. Signed by Judge Tanya S. Chutkan on 11/5/15. (DJS) (Entered: 11/05/2015)   |
| 11/14/2015 | <a href="#">116</a> | <p>TRANSCRIPT OF 11/04/15 STATUS HEARING before Judge Tanya S. Chutkan, held on November 4, 2015. Page Numbers: 1-21. Date of Issuance: 11/14/15. Court Reporter: Bryan A. Wayne; telephone number: 202-354-3186, Transcripts may be ordered by submitting the <a href="#">Transcript Order Form</a>.</p> <p>For the first 90 days after this filing date, the transcript may be viewed at the courthouse at a public terminal or purchased from the court reporter referenced above. After 90 days, the transcript may be accessed via PACER. Other transcript formats, (multi-page, condensed, CD or ASCII) may be purchased from the court reporter.</p> <p><b>NOTICE RE REDACTION OF TRANSCRIPTS:</b> The parties have twenty-one days to file with the court and the court reporter any request to redact personal identifiers from this transcript. If no such requests are filed, the transcript will be made available to the public via PACER without redaction after 90 days. The policy, which includes the five personal identifiers specifically covered, is located on our website at <a href="http://www.dcd.uscourts.gov">www.dcd.uscourts.gov</a>.</p> <p>Redaction Request due 12/5/2015. Redacted Transcript Deadline set for 12/15/2015. Release of Transcript Restriction set for 2/12/2016.(Wayne, Bryan) (Entered: 11/14/2015)</p> |
| 11/19/2015 | <a href="#">117</a> | MOTION for Leave to File <i>Documents Under Seal</i> by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Text of Proposed Order, # <a href="#">2</a> Exhibit Proposed Sealed Exhibit 1 to Rubel Declaration, # <a href="#">3</a> Exhibit Proposed Sealed Exhibit 3 to Rubel Declaration)(Fee, J.) (Entered: 11/19/2015)   |

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| 11/19/2015 | <a href="#"><u>118</u></a> | MOTION for Summary Judgment <i>and Permanent Injunction</i> by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#"><u>1</u></a> Memorandum in Support, # <a href="#"><u>2</u></a> Statement of Facts, # <a href="#"><u>3</u></a> Declaration of Dennis Berry and Exhibits, # <a href="#"><u>4</u></a> Declaration of Steven Cramer and Exhibits, # <a href="#"><u>5</u></a> Declaration of James Golinveaux, # <a href="#"><u>6</u></a> Declaration of Randy Jennings and Exhibit, # <a href="#"><u>7</u></a> Declaration of Thomas O'Brien, Jr. and Exhibits, # <a href="#"><u>8</u></a> Declaration of James Pauley and Exhibits, # <a href="#"><u>9</u></a> Declaration of Kevin Reinertson, # <a href="#"><u>10</u></a> Declaration of Stephanie Reiniche and Exhibits, # <a href="#"><u>11</u></a> Declaration of James Thomas, # <a href="#"><u>12</u></a> Declaration of Jordana Rubel and Exhibits - Part 1, # <a href="#"><u>13</u></a> Declaration of Jordana Rubel and Exhibits - Part 2, # <a href="#"><u>14</u></a> Declaration of Jordana Rubel and Exhibits - Part 3, # <a href="#"><u>15</u></a> Declaration of Jordana Rubel and Exhibits - Part 4, # <a href="#"><u>16</u></a> Declaration of Jordana Rubel and Exhibits - Part 5, # <a href="#"><u>17</u></a> Text of Proposed Order and Injunction)(Fee, J.). Added MOTION for Permanent Injunction on 11/20/2015 (znmw). (Entered: 11/19/2015)  |
| 11/20/2015 |                            | MINUTE ORDER: Granting <a href="#"><u>117</u></a> Motion for Leave to File Documents Under Seal. Plaintiffs may file the following documents under seal: 1) Exhibit 1 to the Declaration of Jordana S. Rubel (which contains the Expert Report of John C. Jarosz); and (2) Exhibit 3 to the Declaration of Jordana S. Rubel, which includes excerpts from the February 27, 2015 deposition of Carl Malamud. Signed by Judge Tanya S. Chutkan on 11/20/15. (DJS) (Entered: 11/20/2015)   |
| 11/20/2015 | <a href="#"><u>119</u></a> | SEALED DOCUMENT filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. re Order on Motion for Leave to File,. (This document is SEALED and only available to authorized persons.)(ztd) (Entered: 11/23/2015)  |
| 12/21/2015 | <a href="#"><u>120</u></a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#"><u>1</u></a> Text of Proposed Order, # <a href="#"><u>2</u></a> Exhibit [Proposed] Sealed Memorandum of Points and Authorities In Support of Defendants' Motion for Summary Judgment and Opposition, # <a href="#"><u>3</u></a> Exhibit [Proposed] Sealed Statement of Material Facts, # <a href="#"><u>4</u></a> Exhibit [Proposed] Sealed Declaration of Matthew Becker In Support, # <a href="#"><u>5</u></a> Exhibit [Proposed] Sealed Index of Consolidated Exhibits, # <a href="#"><u>6</u></a> Exhibit 4, # <a href="#"><u>7</u></a> Exhibit 11, # <a href="#"><u>8</u></a> Exhibit 21, # <a href="#"><u>9</u></a> Exhibit 22, # <a href="#"><u>10</u></a> Exhibit 53, # <a href="#"><u>11</u></a> Exhibit 74, # <a href="#"><u>12</u></a> Exhibit 75, # <a href="#"><u>13</u></a> Exhibit 76, # <a href="#"><u>14</u></a> Exhibit 80, # <a href="#"><u>15</u></a> Exhibit 82, # <a href="#"><u>16</u></a> Exhibit 83, # <a href="#"><u>17</u></a> Exhibit 84, # <a href="#"><u>18</u></a> Exhibit 85, # <a href="#"><u>19</u></a> Exhibit 86, # <a href="#"><u>20</u></a> Exhibit 87, # <a href="#"><u>21</u></a> Exhibit 88, # <a href="#"><u>22</u></a> Exhibit 89, # <a href="#"><u>23</u></a> Exhibit 90, # <a href="#"><u>24</u></a> Exhibit 91, # <a href="#"><u>25</u></a> Exhibit 92, # <a href="#"><u>26</u></a> Exhibit 93, # <a href="#"><u>27</u></a> Exhibit 94, # <a href="#"><u>28</u></a> Exhibit 114, # <a href="#"><u>29</u></a> Exhibit 129, # <a href="#"><u>30</u></a> Exhibit 140, # <a href="#"><u>31</u></a> Exhibit 141, # <a href="#"><u>32</u></a> Exhibit 142, # <a href="#"><u>33</u></a> Exhibit 146, # <a href="#"><u>34</u></a> Exhibit 150, # <a href="#"><u>35</u></a> Exhibit 153)(Bridges, Andrew) (Entered: 12/21/2015) |
| 12/21/2015 | <a href="#"><u>121</u></a> | MOTION for Summary Judgment by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#"><u>1</u></a> Memorandum in Support, # <a href="#"><u>2</u></a> Statement of Facts, # <a href="#"><u>3</u></a> Statement of Disputed Facts, # <a href="#"><u>4</u></a> Objections, # <a href="#"><u>5</u></a> Declaration of Carl Malamud, # <a href="#"><u>6</u></a> Declaration of Matthew Becker, # <a href="#"><u>7</u></a> Request for Judicial Notice, # <a href="#"><u>8</u></a> Index   |

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|            |                     | of Consolidated Exhibits, # <a href="#">9</a> Text of Proposed Order)(Bridges, Andrew) (Entered: 12/21/2015)  |
| 12/22/2015 | <a href="#">122</a> | LARGE ADDITIONAL ATTACHMENT(S) <i>filed</i> by PUBLIC.RESOURCE.ORG, INC. <a href="#">121</a> MOTION for Summary Judgment filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> Exhibit 1-10 Public, # <a href="#">2</a> Exhibit 11-20 Public, # <a href="#">3</a> Exhibit 21-40 Public, # <a href="#">4</a> Exhibit 41-60 Public, # <a href="#">5</a> Exhibit 61-80 Public, # <a href="#">6</a> Exhibit 81-100 Public, # <a href="#">7</a> Exhibit 101-120 Public, # <a href="#">8</a> Exhibit 121-140 Public, # <a href="#">9</a> Exhibit 141-157 Public)(Bridges, Andrew) (Entered: 12/22/2015)   |
| 12/22/2015 | <a href="#">123</a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> Memorandum in Support of Motion to Strike Jarosz Report, # <a href="#">2</a> Exhibit 4 in Support of Kathleen Lu's Declaration, # <a href="#">3</a> Exhibit 6 in support of Kathleen Lu's Declaration, # <a href="#">4</a> Exhibit 8 in support of Kathleen Lu's Declaration, # <a href="#">5</a> Certificate of Service)(Lu, Kathleen) (Entered: 12/22/2015)  |
| 12/22/2015 | <a href="#">124</a> | MOTION to Strike <a href="#">118</a> MOTION for Summary Judgment <i>and Permanent Injunction</i> MOTION for Permanent Injunction by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Memorandum in Support [Redacted], # <a href="#">2</a> Declaration of Kathleen Lu, # <a href="#">3</a> Exhibit 1 to Lu Declaration, # <a href="#">4</a> Exhibit 2 to Lu Declaration, # <a href="#">5</a> Exhibit 3 to Lu Declaration, # <a href="#">6</a> Exhibit 4 [Redacted] to Lu Declaration, # <a href="#">7</a> Exhibit 5 to Lu Declaration, # <a href="#">8</a> Exhibit 6 [Redacted] to Lu Declaration, # <a href="#">9</a> Exhibit 7 to Lu Declaration, # <a href="#">10</a> Exhibit 8 [Redacted] to Lu Declaration, # <a href="#">11</a> Text of Proposed Order)(Bridges, Andrew) (Entered: 12/22/2015) |
| 12/22/2015 | <a href="#">125</a> | CERTIFICATE OF SERVICE by PUBLIC.RESOURCE.ORG, INC. re <a href="#">120</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) . (Bridges, Andrew) (Entered: 12/22/2015)   |
| 12/22/2015 | <a href="#">126</a> | CERTIFICATE OF SERVICE by PUBLIC.RESOURCE.ORG, INC. re <a href="#">123</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) <i>Motion to Strike Jarosz Report.</i> (Lu, Kathleen) (Entered: 12/22/2015)   |
| 12/28/2015 | <a href="#">127</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Gerald W. Griffin, :Firm- Carter Ledyard & Milburn LLP, :Address- 2 Wall Street, New York, NY 10005. Phone No. - (212) 732-3200. Fax No. - (212) 732-3232 Fee Status: Paid, \$100.00, Receipt No. 0090-4361814. by American National Standards Institute, Inc. (Attachments: # <a href="#">1</a> Declaration of Gerald W. Griffin, # <a href="#">2</a> Text of Proposed Order)(Hochman Rothell, Bonnie) Modified on 12/28/2015 to add payment information. (ztnr) (Entered: 12/28/2015)   |
| 12/28/2015 | <a href="#">128</a> | Unopposed MOTION for Leave to File <i>Amicus Curiae Brief</i> by American National Standards Institute, Inc. (Attachments: # <a href="#">1</a> Text of Proposed Order) (Hochman Rothell, Bonnie) (Entered: 12/28/2015)  |

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| 12/28/2015 | <a href="#">129</a> | STIPULATION <i>Regarding Time To Respond To Motion To Strike</i> by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.. (Attachments: # <a href="#">1</a> [Proposed] Order) (Cunningham, Jason) (Entered: 12/28/2015)  |
| 12/29/2015 |                     | MINUTE ORDER: Having considered the Stipulation filed by the parties <a href="#">129</a> , it is hereby ordered that Plaintiffs shall respond to Defendant's motion strike <a href="#">124</a> by January 21, 2016. Defendant's reply brief is due by February 4, 2016. Going forward, the parties must file a motion seeking court approval to extend deadlines. Signed by Judge Tanya S. Chutkan on 12/29/15. (DJS) (Entered: 12/29/2015)  |
| 12/29/2015 |                     | MINUTE ORDER: Granting <a href="#">128</a> Motion for the following entities to file a combined amicus brief on behalf of Plaintiffs: The American National Standards Institute, Inc. ("ANSI"), American Society of Safety Engineers ("ASSE"), The Institute of Electrical and Electronics Engineers, Incorporated ("IEEE"), International Association of Plumbing & Mechanical Officials ("IAPMO"), National Electrical Manufacturers Association ("NEMA"), North American Energy Standards Board ("NAESB"), and Underwriters Laboratories Inc. ("UL"). Signed by Judge Tanya S. Chutkan on 12/29/15. (DJS) (Entered: 12/29/2015) |
| 12/29/2015 |                     | Set/Reset Deadlines: Responses due by 1/21/2016 Replies due by 2/4/2016. (zsm) (Entered: 12/29/2015)   |
| 12/31/2015 | <a href="#">130</a> | MOTION for Leave to File <i>Amicus Curiae Brief</i> by AMERICAN INSURANCE ASSOCIATION (Attachments: # <a href="#">1</a> Text of Proposed Order) (Hollywood, Meegan) Modified on 1/7/2016 (zrdj). (Entered: 12/31/2015)   |
| 01/08/2016 | <a href="#">131</a> | NOTICE of Appearance by Jeffrey T. Pearlman on behalf of Sina Bahram (Pearlman, Jeffrey) (Entered: 01/08/2016)   |
| 01/08/2016 | <a href="#">132</a> | Unopposed MOTION for Leave to File <i>AMICUS CURIAE BRIEF IN SUPPORT OF DEFENDANT</i> by Sina Bahram (Pearlman, Jeffrey). (Entered: 01/08/2016)  |
| 01/08/2016 | <a href="#">133</a> | Unopposed MOTION for Leave to File <i>AMICUS CURIAE BRIEF IN SUPPORT OF DEFENDANT</i> by Sina Bahram (Attachments: # <a href="#">1</a> Text of Proposed Order [PROPOSED] ORDER GRANTING UNOPPOSED MOTION OF SINA BAHRAM FOR LEAVE TO FILE AMICUS CURIAE BRIEF IN SUPPORT OF DEFENDANT)(Pearlman, Jeffrey) (Entered: 01/08/2016)  |
| 01/08/2016 | <a href="#">134</a> | NOTICE of Appearance by Anthony A. Onorato on behalf of International Code Council, Inc. (Onorato, Anthony) (Entered: 01/08/2016)  |
| 01/08/2016 | <a href="#">135</a> | Unopposed MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Alan S. Wernick, :Firm- FisherBroyles LLP, :Address- 203 North LaSalle Street, Suite 2100, Chicago, IL 60601. Phone No. - (847) 786-1005. Fax No. - (847) 412-9965 Filing fee \$ 100, receipt number 0090-4372570. Fee Status: Fee Paid. by International Code Council, Inc. (Onorato, Anthony) (Entered: 01/08/2016)  |
| 01/08/2016 | <a href="#">136</a> |  |

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|            |                     | Unopposed MOTION for Leave to File <i>Amicus Curiae Brief in Support of Plaintiffs' Motion for Summary Judgment</i> by International Code Council, Inc. (Attachments: # <a href="#">1</a> Text of Proposed Order)(Onorato, Anthony) (Entered: 01/08/2016)   |
| 01/08/2016 | <a href="#">137</a> | AFFIDAVIT re <a href="#">135</a> Unopposed MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Alan S. Wernick, :Firm- FisherBroyles LLP, :Address- 203 North LaSalle Street, Suite 2100, Chicago, IL 60601. Phone No. - (847) 786-1005. Fax No. - (847) 412-9965 Filing <i>Declaration of Alan S. Wernick in Support of Motion for Admission Pro Hac Vice and Proposed Order</i> by International Code Council, Inc.. (Attachments: # <a href="#">1</a> Text of Proposed Order) (Onorato, Anthony) (Entered: 01/08/2016)   |
| 01/09/2016 |                     | MINUTE ORDER: Granting <a href="#">135</a> Motion for Leave to Appear Pro Hac Vice. Attorney Alan S. Wernick is hereby admitted pro hac vice to appear in this matter on behalf of amicus International Code Council, Inc. Signed by Judge Tanya S. Chutkan on 1/9/16. (DJS) Modified on 1/9/2016 (DJS). (Entered: 01/09/2016)  |
| 01/09/2016 |                     | MINUTE ORDER: Granting <a href="#">127</a> Motion for Leave to Appear Pro Hac Vice. Attorney Gerald W. Griffin is hereby admitted pro hac vice to appear in this matter on behalf of amici The American National Standards Institute, Inc. ("ANSI"), American Society of Safety Engineers ("ASSE"), The Institute of Electrical and Electronics Engineers, Incorporated ("IEEE"), International Association of Plumbing & Mechanical Officials ("IAPMO"), National Electrical Manufacturers Association ("NEMA"), North American Energy Standards Board ("NAESB"), and Underwriters Laboratories Inc. ("UL"). Signed by Judge Tanya S. Chutkan on 1/9/16. (DJS) (Entered: 01/09/2016) |
| 01/10/2016 |                     | MINUTE ORDER: Granting <a href="#">130</a> Motion for American Insurance Association (AIA) to file an amicus brief on behalf of Plaintiffs. Signed by Judge Tanya S. Chutkan on 1/10/16. (DJS) (Entered: 01/10/2016)  |
| 01/10/2016 |                     | MINUTE ORDER: Granting <a href="#">133</a> Motion for Sina Bahram to file an amicus brief on behalf of Defendant. Signed by Judge Tanya S. Chutkan on 1/10/16. (DJS) (Entered: 01/10/2016)  |
| 01/10/2016 |                     | MINUTE ORDER: Granting <a href="#">136</a> Motion of International Code Council, Inc. to file an amicus brief on behalf of Plaintiffs. Signed by Judge Tanya S. Chutkan on 1/10/16. (DJS) (Entered: 01/10/2016)   |
| 01/11/2016 | <a href="#">138</a> | NOTICE of Appearance by Charles Duan on behalf of PUBLIC KNOWLEDGE, KNOWLEGE ECOLOGY INTERNATIONAL, AMERICAN LIBRARY ASSOCIATION (Duan, Charles) (Entered: 01/11/2016)  |
| 01/11/2016 | <a href="#">139</a> | Amicus brief by AMERICAN INSURANCE ASSOCIATION in support of Plaintiffs' Motion for Summary Judgment. (Hollywood, Meegan) Modified on 1/12/2016 (DJS). (Entered: 01/11/2016)  |
| 01/11/2016 | <a href="#">140</a> | MOTION for Leave to File <i>Amicus Curiae Brief</i> by AMERICAN LIBRARY ASSOCIATION, KNOWLEGE ECOLOGY INTERNATIONAL, PUBLIC KNOWLEDGE (Attachments: # <a href="#">1</a> Exhibit Amicus Curiae Brief, # <a href="#">2</a> Text of  |

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|            |                     | Proposed Order Proposed Order, # <a href="#">3</a> Exhibit Corporate Disclosure Statement) (Duan, Charles) (Entered: 01/11/2016)  |
| 01/11/2016 | <a href="#">141</a> | Unopposed MOTION for Leave to File <i>Amicus Brief</i> by Law Scholars (Attachments: # <a href="#">1</a> Exhibit Amicus Brief, # <a href="#">2</a> Text of Proposed Order Proposed order)(Gellis, Catherine) (Entered: 01/11/2016)                              |
| 01/11/2016 |                     | ORDER granting <a href="#">140</a> Motion for Leave to File Brief of Amici Curiae. Signed by Judge Tanya S. Chutkan on 1/11/16. (lctsc2) (Entered: 01/11/2016)  |
| 01/11/2016 |                     | ORDER granting <a href="#">141</a> Motion for Leave to File Brief of Amici Curiae. Signed by Judge Tanya S. Chutkan on 1/11/16. (lctsc2) (Entered: 01/11/2016)  |
| 01/11/2016 | <a href="#">142</a> | Amicus Brief by AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (Hochman Rothell, Bonnie) Modified on 1/12/2016 (DJS). (Entered: 01/11/2016)  |
| 01/11/2016 | <a href="#">143</a> | NOTICE of Appearance by Bruce D. Brown on behalf of The Reporters Committee for Freedom of the Press (Brown, Bruce) (Main Document 143 replaced on 1/12/2016) (ztd). (Entered: 01/11/2016)  |
| 01/11/2016 | <a href="#">144</a> | Consent MOTION for Leave to File <i>Amicus Curiae Brief</i> by The Reporters Committee for Freedom of the Press (Attachments: # <a href="#">1</a> Proposed Amicus Curiae Brief, # <a href="#">2</a> Text of Proposed Order)(Brown, Bruce) (Entered: 01/11/2016) |
| 01/11/2016 | <a href="#">145</a> | Amicus Brief by INTERNATIONAL CODE COUNCIL, INC. (Onorato, Anthony) Modified on 1/12/2016 (DJS). (Entered: 01/11/2016)  |
| 01/11/2016 | <a href="#">146</a> | Amicus Brief by SINA BAHRAM. (Pearlman, Jeffrey) Modified on 1/12/2016 (DJS). (Entered: 01/11/2016)   |
| 01/11/2016 | <a href="#">147</a> | AMICUS BRIEF by AMERICAN LIBRARY ASSOCIATION, KNOWLEGE ECOLOGY INTERNATIONAL, PUBLIC KNOWLEDGE. (znmw) (Entered: 01/12/2016)  |
| 01/11/2016 | <a href="#">148</a> | LCvR 7.1 CERTIFICATE OF DISCLOSURE of Corporate Affiliations and Financial Interests by AMERICAN LIBRARY ASSOCIATION, KNOWLEGE ECOLOGY INTERNATIONAL, PUBLIC KNOWLEDGE. (znmw) (Entered: 01/12/2016)  |
| 01/11/2016 | <a href="#">149</a> | AMICUS BRIEF by LAW SCHOLARS. (znmw) (Entered: 01/12/2016)  |
| 01/11/2016 | <a href="#">150</a> | ENTERED IN ERROR. . . . Corporate Disclosure Statement by AMERICAN LIBRARY ASSOCIATION, KNOWLEGE ECOLOGY INTERNATIONAL, PUBLIC KNOWLEDGE. (td) Modified on 1/12/2016 (td). (Entered: 01/12/2016)  |
| 01/12/2016 |                     | ORDER granting <a href="#">144</a> Motion for Leave to File Brief of Amicus Curiae. Signed by Judge Tanya S. Chutkan on 1/12/16. (lctsc2) (Entered: 01/12/2016)   |
| 01/12/2016 |                     | NOTICE OF CORRECTED DOCKET ENTRY: re <a href="#">150</a> Corporate Disclosure Statement was entered in error and is a duplicate of docket entry no. <a href="#">148</a> . (td) (Entered: 01/12/2016)  |
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| 01/12/2016 | <a href="#">151</a> | AMICUS BRIEF by REPORTERS COMMITTEE FOR FREEDOM OF THE PRESS. (td) (Entered: 01/12/2016)   |
| 01/13/2016 | <a href="#">152</a> | Consent MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Sebastian E. Kaplan, :Firm- Fenwick & West LLP, :Address- 555 California Street, 12th Fl., San Francisco, CA 94104. Phone No. - (415) 875-2300. Fax No. - (415) 281-1350 Filing fee \$ 100, receipt number 0090-4377635. Fee Status: Fee Paid. by PUBLIC.RESOURCE.ORG, INC. (Attachments: # <a href="#">1</a> Declaration of Sebastian Kaplan, # <a href="#">2</a> Text of Proposed Order)(Stoltz, Mitchell) (Entered: 01/13/2016)   |
| 01/21/2016 | <a href="#">153</a> | VACATED PURSUANT TO MINUTE ORDER FILED 2/3/16. . . .ORDER: Holding in abeyance Defendant's motion to file documents under seal <a href="#">120</a> . Defendant's filing due 2/5/16. (See order for details). Signed by Judge Tanya S. Chutkan on 1/21/16. (DJS) Modified on 2/3/2016 (td). (Entered: 01/21/2016)   |
| 01/21/2016 | <a href="#">154</a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> Text of Proposed Order Proposed Order Granting Motion to Seal, # <a href="#">2</a> Exhibit Exhibit A to Declaration of Christian Dubay, # <a href="#">3</a> Exhibit Exhibit 1 to Declaration of Steve Comstock)(Klaus, Kelly) (Entered: 01/21/2016)  |
| 01/21/2016 | <a href="#">155</a> | REPLY to opposition to motion re <a href="#">118</a> MOTION for Summary Judgment filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Attachments: # <a href="#">1</a> Supplemental Statement of Undisputed Facts, # <a href="#">2</a> Disputes with Defendant's Statement of Facts, Evidentiary Objections and Opposition to Request for Judicial Notice, # <a href="#">3</a> Response to Defendant's Statement of Facts, # <a href="#">4</a> Response to Defendant's Evidentiary Objections, # <a href="#">5</a> Declaration of Steven Comstock, # <a href="#">6</a> Declaration of Christian Dubay, # <a href="#">7</a> Supplemental Declaration of Thomas O'Brien, # <a href="#">8</a> Supplemental Declaration of Jordana Rubel, # <a href="#">9</a> Supplemental Declaration of James Thomas)(Fee, J.) Modified on 1/22/2016 to correct linkage (td). (Entered: 01/21/2016) |
| 01/21/2016 | <a href="#">156</a> | Memorandum in opposition to re <a href="#">124</a> MOTION to Strike <a href="#">118</a> MOTION for Summary Judgment <i>and Permanent Injunction</i> MOTION for Permanent Injunction filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC.. (Fee, J.) (Entered: 01/21/2016)   |
| 01/21/2016 | 157                 | Memorandum in opposition to re <a href="#">121</a> MOTION for Summary Judgment filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., NATIONAL FIRE PROTECTION ASSOCIATION, INC..(See docket entry no. {155} (td) (Entered: 01/22/2016)  |
| 01/22/2016 |                     | Set/Reset Deadlines: Defendant's Supplemental Filing due by 2/5/2016. (tth) (Entered: 01/22/2016)  |

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| 01/25/2016 | <a href="#">158</a> | MOTION to Withdraw as Attorney <i>Simeon M Schopf</i> by AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC. (Attachments: # <a href="#">1</a> Text of Proposed Order Proposed Order)(Cunningham, Jason) (Entered: 01/25/2016)  |
| 01/27/2016 | <a href="#">159</a> | MOTION for Leave to Appear Pro Hac Vice :Attorney Name- Rose Leda Ehler, :Firm- MUNGER, TOLLES & OLSON LLP, :Address- 560 Mission St., 27th Floor, San Francisco, CA 94105-2907. Phone No. - (415) 512-4000. Fax No. - (415) 644-6971 Filing fee \$ 100, receipt number 0090-4391071. Fee Status: Fee Paid. by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Declaration of Rose Leda Ehler in support of Motion to Admit Pro Hac Vice, # <a href="#">2</a> Text of Proposed Order of Admission Pro Hac Vice) (Choudhury, Anjan) (Entered: 01/27/2016)  |
| 01/28/2016 |                     | MINUTE ORDER: Granting <a href="#">159</a> Motion for Leave to Appear Pro Hac Vice. Attorney Rose Leda Ehler is hereby admitted pro hac vice to appear in this matter on behalf of Plaintiff National Fire Protection Association, Inc. Signed by Judge Tanya S. Chutkan on 1/28/16. (DJS) (Entered: 01/28/2016)   |
| 01/29/2016 |                     | MINUTE ORDER granting <a href="#">158</a> Motion to Withdraw as Attorney. Attorney Simeon Meir Schopf terminated. Signed by Judge Tanya S. Chutkan on 1/29/16. (zsm) (Entered: 01/29/2016)   |
| 02/03/2016 |                     | MINUTE ORDER: The Court's 1/21/16 Order <a href="#">153</a> is hereby VACATED. Signed by Judge Tanya S. Chutkan on 2/3/16. (DJS) (Entered: 02/03/2016)   |
| 02/04/2016 |                     | MINUTE ORDER granting <a href="#">120</a> Sealed Motion for Leave to File Document Under Seal; granting <a href="#">123</a> Sealed Motion for Leave to File Document Under Seal; granting <a href="#">154</a> Sealed Motion for Leave to File Document Under Seal. Signed by Judge Tanya S. Chutkan on 2/4/16. (zsm) (Entered: 02/04/2016)   |
| 02/04/2016 | <a href="#">160</a> | SEALED DOCUMENT (Main document Part 1 of 4) filed by PUBLIC.RESOURCE.ORG, INC.. re Order on Sealed Motion for Leave to File Document Under Seal,,,,,. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> Part 2 of 4, # <a href="#">2</a> Part 3 of 4, # <a href="#">3</a> Part 4 of 4)(ztd) (Entered: 02/04/2016)  |
| 02/04/2016 | <a href="#">161</a> | SEALED DOCUMENT filed by PUBLIC.RESOURCE.ORG, INC.. re <a href="#">160</a> Sealed Document, filed by PUBLIC.RESOURCE.ORG, INC.. (This document is SEALED and only available to authorized persons.)(ztd) (Entered: 02/04/2016)   |
| 02/04/2016 | <a href="#">162</a> | SEALED DOCUMENT (Part 1 of 27) filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC.. re Order on Sealed Motion for Leave to File Document Under Seal,,,,,. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> Part 2 of 27, # <a href="#">2</a> Part 3 of 27, # <a href="#">3</a> Part 4 of 27, # <a href="#">4</a> Part 5 of 27, # <a href="#">5</a> Part 6 of 27, # <a href="#">6</a> Part 7 of 27, # <a href="#">7</a> Part 8 of 27, # <a href="#">8</a> Part 9 of 27, # <a href="#">9</a> Part 10 of 27, # <a href="#">10</a> Part 11 of 27, # <a href="#">11</a> Part 12 of 27, # <a href="#">12</a> Part 13 of 27, # <a href="#">13</a> Part 14 of 27, # <a href="#">14</a> Part 15 of 27, # <a href="#">15</a> Part 16 of 27, # <a href="#">16</a> Part 17 of 27, # <a href="#">17</a> Part 18 of 27, # <a href="#">18</a> Part 19 of 27, # <a href="#">19</a> Part 20 of 27, # <a href="#">20</a> Part 21 of 27, # <a href="#">21</a> Part 22 of 27, # <a href="#">22</a> Part 23 of 27, # <a href="#">23</a> Part 24 of |

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|            |                     | 27, # <a href="#">24</a> Part 25 of 27, # <a href="#">25</a> Part 26 of 27, # <a href="#">26</a> Part 27 of 27)(ztd) (Entered: 02/04/2016)  |
| 02/04/2016 | <a href="#">163</a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> [Sealed] Matthew Becker Declaration, # <a href="#">2</a> [Sealed] Supplemental Statement of Undisputed Material Facts, # <a href="#">3</a> [Sealed] Supplemental Statement of Disputed Material Facts, # <a href="#">4</a> [Sealed] Consolidated List of Exhibits, # <a href="#">5</a> [Sealed] Exhibit 7, # <a href="#">6</a> [Sealed] Exhibit 10, # <a href="#">7</a> [Sealed] Exhibit 11, # <a href="#">8</a> Text of Proposed Order, # <a href="#">9</a> Certificate of Service)(Bridges, Andrew) (Entered: 02/05/2016)  |
| 02/05/2016 | <a href="#">164</a> | REPLY in support of motion re <a href="#">163</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.), <a href="#">120</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) filed by PUBLIC.RESOURCE.ORG, INC.. (Attachments: # <a href="#">1</a> [Redacted] Declaration of Matthew Becker, # <a href="#">2</a> [Redacted] Consolidated List of Exhibits, # <a href="#">3</a> [Redacted] Response to Supplemental Statement of Facts, # <a href="#">4</a> [Redacted] Response to Statement of Disputed Facts, # <a href="#">5</a> Supplemental Objections to Evidence, # <a href="#">6</a> Response to Evidentiary Objections, # <a href="#">7</a> Supplemental Request for Judicial Notice, # <a href="#">8</a> Supplemental Declaration of Carl Malamud, # <a href="#">9</a> Exhibit 1, # <a href="#">10</a> Exhibit 2, # <a href="#">11</a> Exhibit 3, # <a href="#">12</a> Exhibit 4, # <a href="#">13</a> Exhibit 5, # <a href="#">14</a> Exhibit 6, # <a href="#">15</a> Exhibit [Redacted] 7, # <a href="#">16</a> Exhibit 8, # <a href="#">17</a> Exhibit 9, # <a href="#">18</a> Exhibit [Redacted] 10, # <a href="#">19</a> Exhibit [Redacted] 11, # <a href="#">20</a> Exhibit 12, # <a href="#">21</a> Exhibit 13, # <a href="#">22</a> Exhibit 14, # <a href="#">23</a> Exhibit 15, # <a href="#">24</a> Exhibit 16, # <a href="#">25</a> Exhibit 17)(Bridges, Andrew) Modified text on 2/5/2016 (ztd). (Entered: 02/05/2016) |
| 02/05/2016 | <a href="#">165</a> | SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) (Attachments: # <a href="#">1</a> [Sealed] Reply In Support of Motion to Strike the Expert Report of John Jarosz, # <a href="#">2</a> Text of Proposed Order, # <a href="#">3</a> Certificate of Service)(Bridges, Andrew) (Entered: 02/05/2016)   |
| 02/05/2016 | <a href="#">166</a> | REPLY in support to motion re <a href="#">165</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.), <a href="#">123</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL filed by PUBLIC.RESOURCE.ORG, INC. (This document is SEALED and only available to authorized persons.) filed by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) Modified text on 2/5/2016 (ztd). (Entered: 02/05/2016)   |
| 02/05/2016 |                     | MINUTE ORDER granting <a href="#">163</a> Sealed Motion for Leave to File Document Under Seal; granting <a href="#">165</a> Sealed Motion for Leave to File Document Under Seal. Signed by Judge Tanya S. Chutkan on 2/5/16. (zsm) (Entered: 02/05/2016)  |
| 02/05/2016 | <a href="#">167</a> |   |

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|            |                     | SEALED DOCUMENT filed by PUBLIC.RESOURCE.ORG, INC.. re Order on Sealed Motion for Leave to File Document Under Seal,. (This document is SEALED and only available to authorized persons.)(ztd) (Entered: 02/05/2016)  |
| 02/05/2016 | <a href="#">168</a> | SEALED REPLY TO OPPOSITION filed by PUBLIC.RESOURCE.ORG, INC. re <a href="#">124</a> MOTION to Strike <a href="#">118</a> MOTION for Summary Judgment <i>and Permanent Injunction</i> MOTION for Permanent Injunction (ztd) (Entered: 02/05/2016)   |
| 02/08/2016 |                     | MINUTE ORDER: Granting <a href="#">152</a> Motion for Leave to Appear Pro Hac Vice. Attorney Sebastian E. Kaplan is hereby admitted pro hac vice to appear in this matter on behalf of Defendant. Signed by Judge Tanya S. Chutkan on 2/8/16. (DJS) (Entered: 02/08/2016)   |
| 02/08/2016 | <a href="#">169</a> | MOTION to Take Judicial Notice by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Attachments: # <a href="#">1</a> Exhibit 1 to Plaintiffs' Request For Judicial Notice)(Ehler, Rose) (Entered: 02/08/2016)   |
| 03/14/2016 |                     | SEALED MINUTE ORDER granting <a href="#">97</a> SEALED MOTION FOR LEAVE TO FILE DOCUMENT UNDER SEAL(This document is SEALED and only available to authorized persons.)Signed by Judge Tanya S. Chutkan on 3/14/16. (zsm) (Entered: 03/14/2016)  |
| 03/14/2016 | <a href="#">170</a> | SEALED DOCUMENT (Exhibits) filed by AMERICAN SOCIETY FOR TESTING AND MATERIALS. re Sealed Order. (This document is SEALED and only available to authorized persons.)(ztd) (Entered: 03/14/2016)   |
| 06/03/2016 |                     | MINUTE ORDER. Motion Hearing on all pending motions set for 9/12/2016 at 9:30 AM in Courtroom 2 before Judge Tanya S. Chutkan. Signed by Judge Tanya S. Chutkan on 6/3/16. (lctsc2) (Entered: 06/03/2016)   |
| 06/03/2016 |                     | Set/Reset Hearings: Motion Hearing set for 9/12/2016 at 9:30 AM in Courtroom 2 before Judge Tanya S. Chutkan. (zsm) (Entered: 06/03/2016)   |
| 06/30/2016 | <a href="#">171</a> | NOTICE of Withdrawal of Counsel of Nathan M. Rehn by NATIONAL FIRE PROTECTION ASSOCIATION, INC. (Rehn, Nathan) (Entered: 06/30/2016)  |
| 09/09/2016 |                     | MINUTE ORDER: The motions hearing previously scheduled for 9:30 a.m. on 9/12/2016 has been rescheduled to begin at 9:00 a.m. in Courtroom 2. Signed by Judge Tanya S. Chutkan on 9/9/2016. (lctsc2) (Entered: 09/09/2016)   |
| 09/09/2016 |                     | Set/Reset Hearings: Motion Hearing set for 9/12/2016 at 9:00 AM in Courtroom 2 before Judge Tanya S. Chutkan. (zsm) (Entered: 09/09/2016)   |
| 09/12/2016 |                     | Minute Entry for proceedings held before Judge Tanya S. Chutkan: Motion Hearing held on 9/12/2016 re <a href="#">118</a> MOTION for Summary Judgment and Permanent Injunction MOTION for Permanent Injunction filed by NATIONAL FIRE PROTECTION ASSOCIATION, INC., AMERICAN SOCIETY FOR TESTING AND MATERIALS, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., <a href="#">121</a> MOTION for Summary Judgment filed by PUBLIC.RESOURCE.ORG, INC. Motions taken under advisement. (Court Reporter Bryan Wayne.) (zsm) (Entered: 09/12/2016) |
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| 09/21/2016 | <a href="#">172</a> | ORDER denying <a href="#">124</a> Motion to Strike Expert Report. Signed by Judge Tanya S. Chutkan on 9/21/2016. (lctsc2) (Entered: 09/21/2016)  |
| 09/21/2016 |                     | MINUTE ORDER granting <a href="#">169</a> Plaintiffs' Motion to Take Judicial Notice. Signed by Judge Tanya S. Chutkan on 9/21/2016. (lctsc2) (Entered: 09/21/2016)  |
| 10/13/2016 | <a href="#">173</a> | <p>TRANSCRIPT OF 9/12/16 MOTIONS HEARING, before Judge Tanya S. Chutkan, held on September 12, 2016. Page Numbers: 1-142. Date of Issuance: 10/13/16. Court Reporter: Bryan A. Wayne. Transcripts may be ordered by submitting the <a href="#">Transcript Order Form</a></p> <p>For the first 90 days after this filing date, the transcript may be viewed at the courthouse at a public terminal or purchased from the court reporter referenced above. After 90 days, the transcript may be accessed via PACER. Other transcript formats, (multi-page, condensed, CD or ASCII) may be purchased from the court reporter.</p> <p><b>NOTICE RE REDACTION OF TRANSCRIPTS:</b> The parties have twenty-one days to file with the court and the court reporter any request to redact personal identifiers from this transcript. If no such requests are filed, the transcript will be made available to the public via PACER without redaction after 90 days. The policy, which includes the five personal identifiers specifically covered, is located on our website at <a href="http://www.dcd.uscourts.gov">www.dcd.uscourts.gov</a>.</p> <p>Redaction Request due 11/3/2016. Redacted Transcript Deadline set for 11/13/2016. Release of Transcript Restriction set for 1/11/2017.(Wayne, Bryan) (Entered: 10/13/2016)</p> |
| 10/14/2016 | <a href="#">174</a> | NOTICE OF WITHDRAWAL OF APPEARANCE as to PUBLIC.RESOURCE.ORG, INC.. Attorney Kathleen Lu terminated. (Lu, Kathleen) (Entered: 10/14/2016)  |
| 02/02/2017 | <a href="#">175</a> | MEMORANDUM AND OPINION re <a href="#">118</a> Plaintiffs' motion for summary judgment and <a href="#">121</a> Defendant's cross-motion for summary judgment. Signed by Judge Tanya S. Chutkan on 2/2/2017. (lctsc2) (Entered: 02/02/2017)  |
| 02/02/2017 | <a href="#">176</a> | ORDER granting <a href="#">118</a> Plaintiffs' motion for summary judgment and denying <a href="#">121</a> Defendant's cross-motion for summary judgment. See Order for more details. Signed by Judge Tanya S. Chutkan on 2/2/2017. (lctsc2) (Entered: 02/02/2017)   |
| 02/02/2017 |                     | MINUTE ORDER: Parties are ORDERED to submit a JOINT status report by 2/17/2017 (1) updating the court as to Defendant's compliance with <a href="#">176</a> the court's order to remove the nine standards from its website and to cease all unauthorized use of Plaintiffs' trademarks, and (2) providing a jointly proposed schedule for this case going forward to resolve Plaintiffs' claims as to the remaining standards. Signed by Judge Tanya S. Chutkan on 2/2/2017. (lctsc2) (Entered: 02/02/2017)   |
| 02/03/2017 |                     | Set/Reset Deadlines: Joint Status Report due by 2/17/2017. (tb) (Entered: 02/03/2017)  |

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|------------|---------------------|---|
| 02/15/2017 | <a href="#">177</a> | NOTICE OF APPEAL TO DC CIRCUIT COURT as to <a href="#">175</a> Memorandum & Opinion, <a href="#">176</a> Order on Motion for Summary Judgment, Order on Motion for Permanent Injunction, by PUBLIC.RESOURCE.ORG, INC.. Filing fee \$ 505, receipt number 0090-4843999. Fee Status: Fee Paid. Parties have been notified. (Bridges, Andrew) (Entered: 02/15/2017)  |
| 02/16/2017 | <a href="#">178</a> | Transmission of the Notice of Appeal, Order Appealed, and Docket Sheet to US Court of Appeals. The Court of Appeals fee was paid this date 2/15/17 re <a href="#">177</a> Notice of Appeal to DC Circuit Court,. (td) (Entered: 02/16/2017)   |
| 02/17/2017 | <a href="#">179</a> | Joint STATUS REPORT by AMERICAN SOCIETY FOR TESTING AND MATERIALS. (Rubel, Jordana) (Entered: 02/17/2017)   |
| 02/28/2017 |                     | USCA Case Number 17-7035 for <a href="#">177</a> Notice of Appeal to DC Circuit Court, filed by PUBLIC.RESOURCE.ORG, INC.. (td) (Entered: 02/28/2017)   |
| 03/01/2017 | <a href="#">180</a> | NOTICE <i>RE PRELIMINARY AND NON-BINDING STATEMENT OF ISSUES BY APPELLANT/DEFENDANT-COUNTERCLAIMANT PUBLIC.RESOURCE.ORG, INC.</i> by PUBLIC.RESOURCE.ORG, INC. (Bridges, Andrew) (Entered: 03/01/2017)  |
| 03/01/2017 | <a href="#">181</a> | NOTICE <i>OF TRANSCRIPT ORDER BY DEFENDANT-COUNTERCLAIMANT PUBLIC.RESOURCE.ORG, INC.</i> by PUBLIC.RESOURCE.ORG, INC. (Bridges, Andrew) (Entered: 03/01/2017)   |
| 04/03/2017 | <a href="#">182</a> | ORDER amending <a href="#">176</a> Order. Signed by Judge Tanya S. Chutkan on 4/3/2017. (lctsc2) (Entered: 04/03/2017)  |
| 04/06/2017 | <a href="#">183</a> | Amended NOTICE OF APPEAL re appeal <a href="#">177</a> by PUBLIC.RESOURCE.ORG, INC.. (Bridges, Andrew) (Entered: 04/06/2017)  |
| 04/07/2017 | <a href="#">184</a> | Supplemental Record on Appeal transmitted to US Court of Appeals re <a href="#">183</a> Amended Notice of Appeal ;USCA Case Number 17-7035. (jf) (Entered: 04/07/2017)  |
| 07/06/2017 |                     | MINUTE ORDER: In light of the parties' pending appeal before the Circuit Court, the Clerk of the Court is hereby directed to Administratively Close this case. Upon resolution of the appeal (#17-7035) the parties may file a motion to return this case to the court's active docket. Any such motion shall contain a proposed order for moving forward with this case. Signed by Judge Tanya S. Chutkan on 7/6/17. (DJS) (Entered: 07/06/2017) |

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# EXHIBIT A

| Designation      | Edition       | Title   | Registration Certificate Number |
|------------------|---------------|---|---------------------------------|
| ASTM A36         | 1977ae        | Standard Specification for Structural Steel   | TX 464-573                      |
| ASTM A36/A36M    | 1997ae1       | Standard Specification for Carbon Structural Steel  | TX 4-873-764                    |
| ASTM A82         | 1979          | Standard Specification for Cold-Drawn Steel Wire for Concrete Reinforcement   | TX 464-573                      |
| ASTM A106/A106 M | 2004b         | Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service  | TX 7-685-938                    |
| ASTM A184        | 1979          | Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement  | TX 464-573                      |
| ASTM A185        | 1979          | Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement  | TX 464-573                      |
| ASTM A203/A 203M | 1997          | Standard Specification for Pressure Vessel Plates, Alloy Steel, Nickel  | TX 4-654-921                    |
| ASTM A242        | 1979          | Standard Specification for High-Strength Low-Alloy Structural Steel   | TX 464-573                      |
| ASTM A285        | 1978          | Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength                                   | TX 464-573                      |
| ASTM A307        | 1978e         | Standard Specification for Carbon Steel Externally Threaded Standard Fasteners  | TX 464-573                      |
| ASTM A325        | 1979          | Standard Specification for High-Strength Bolts for Structural Steel Joints  | TX 464-573                      |
| ASTM A333/A 333M | 1994          | Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service   | TX 4-083-251                    |
| ASTM A369/A 369M | 1992          | Standard Specification for Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service                             | TX 4-083-251                    |
| ASTM A370        | 1977e 2       | Standard Methods and Definitions for Mechanical Testing of Steel Products   | TX 434-207                      |
| ASTM A441        | 1979          | Standard Specification for High-Strength Low-Alloy Structural Manganese Vanadium Steel  | TX 464-573                      |
| ASTM A449        | 1978a         | Standard Specification for Quenched and Tempered Steel Bolts and Studs  | TX 464-573                      |
| ASTM A475        | 1978(1984)e 1 | Standard Specification for Zinc-Coated Steel Wire Strand  | TX 464-574                      |
| ASTM A490        | 1979          | Standard Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints  | TX 464-573                      |
| ASTM A496        | 1978          | Standard Specification for Deformed Steel Wire for Concrete Reinforcement   | TX 464-573                      |
| ASTM A497        | 1979          | Standard Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement   | TX 464-573                      |
| ASTM A500        | 1978          | Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes                            | TX 464-573                      |
| ASTM A501        | 1976          | Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing  | TX 464-573                      |
| ASTM A502        | 1976          | Standard Specification for Steel Structural Rivets  | TX 464-573                      |
| ASTM A514        | 1977          | Standard Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding                             | TX 464-573                      |
| ASTM A516/A 516M | 1990(1996)e1  | Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate and Lower-Temperature Service                               | TX 4-654-921                    |
| ASTM A522/A 522M | 1995b         | Standard Specification for Forged or Rolled 8 and 9 % Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service | TX 4-179-992                    |

| Designation      | Edition    | Title   | Registration Certificate Number |
|------------------|------------|---|---------------------------------|
| ASTM A520        | 1972(1985) | Standard Specification for<br>Supplementary Requirements for Seamless and<br>Electric-Resistance-Welded Carbon Steel<br>Tubular Products for High-Temperature<br>Service Conforming to ISO Recommendations<br>For Boiler Construction | TX 1-798-078                    |
| ASTM A529        | 1975       | Standard Specification for Structural Steel with 42,000PSI (290 Mpa) Minimum Yield Point<br>(1/2 in. (12.7 mm) Maximum Thickness  | TX 464-573                      |
| ASTM A539        | 1990a      | Standard Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel<br>Oil Lines   | TX 3-043-643                    |
| ASTM A570        | 1979       | Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality  | TX 464-573                      |
| ASTM A572        | 1979       | Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of<br>Structural Quality   | TX 464-573                      |
| ASTM A588        | 1979a      | Standard Specification for High-Strength Low-Alloy Structural Steel with 50, 000 psi<br>Minimum Yield Point to 4 in. Thick  | TX 464-573                      |
| ASTM A611        | 1972(1979) | Standard Specification for Steel, Cold-rolled Sheet, Carbon, Structural   | TX 464-573                      |
| ASTM A615        | 1979       | Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement  | TX 464-573                      |
| ASTM A616        | 1979       | Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement  | TX 464-573                      |
| ASTM A617        | 1979       | Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement  | TX 464-573                      |
| ASTM A618        | 1974       | Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy<br>Structural Tubing  | TX 464-573                      |
| ASTM A633        | 1979a      | Standard Specification for Normalized High-Strength Low Alloy Structural Steel  | TX 464-573                      |
| ASTM B16         | 1992       | Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw<br>Machines  | TX 3-614-178                    |
| ASTM B21         | 1983b      | Standard Specification for Naval Brass Rod, Bar, and Shapes   | TX 1-228-879                    |
| ASTM B21         | 1996       | Standard Specification for Naval Brass Rod, Bar, and Shapes   | TX 4-497-885                    |
| ASTM B42         | 1996       | Standard Specification for Seamless Copper Pipe, Standard Sizes   | TX 4-497-885                    |
| ASTM B68         | 1995       | Standard Specification for Seamless Copper Tube, Bright Annealed  | TX 4-243-005                    |
| ASTM B75         | 1997       | Standard Specification for Seamless Copper Tube   | TX 4-737-834                    |
| ASTM B85         | 1984       | Standard Specification for Aluminum-Alloy Die Castings  | TX 1-689-871                    |
| ASTM B88         | 1996       | Standard Specification for Seamless Copper Water Tube   | TX 4-497-885                    |
| ASTM B96         | 1993       | Standard Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General<br>Purposes and Pressure Vessels  | TX 3-883-920                    |
| ASTM B111        | 1995       | Standard Specification for Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule<br>Stock  | TX 4-243-005                    |
| ASTM B122/B 122M | 1995       | Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver),<br>and Copper-Nickel Alloy Plate, Sheet, Strip and Rolled Bar   | TX 4-243-005                    |
| ASTM B124        | 1996       | Standard Specification for Copper and Copper-Alloy Forging Rod, Bar, and Shapes   | TX 4-497-885                    |

| Designation | Edition       | Title  | Registration Certificate Number |
|-------------|---------------|--|---------------------------------|
| ASTM B152   | 1997a         | Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar  | TX 4-737-834                    |
| ASTM B193   | 1987          | Standard Test Method for Resistivity of Electrical Conductor Materials   | TX 2-348-166                    |
| ASTM B209   | 1996          | Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate   | TX 4-475-108                    |
| ASTM B224   | 1980e 1       | Standard Classification of Coppers   | TX 1-228-879                    |
| ASTM B280   | 1997          | Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service   | TX 4-497-885                    |
| ASTM B283   | 1996          | Standard Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)  | TX 4-497-885                    |
| ASTM B315   | 1993          | Standard Specification for Seamless Copper Alloy Pipe and Tube   | TX 4-243-005                    |
| ASTM B557   | 1984          | Standard Methods of Tension Testing Wrought and Cast Aluminum and Magnesium-Alloy Products   | TX 1-689-871                    |
| ASTM B580   | 1979          | Standard Specification for Anodized Oxide Coatings on Aluminum   | TX 534-160                      |
| ASTM B694   | 1986          | Standard Specification for Copper, Copper Alloy, and Copper-Clad Stainless Steel Sheet and Strip for Electrical Cable Shielding              | TX 2-110-040                    |
| ASTM B858   | 1995          | Standard Test Method for Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys Using an Ammonia Vapor Test           | TX 4-243-005                    |
| ASTM C5     | 1979(1997)    | Standard Specification for Quicklime for Structural Purposes   | TX 4-787-636                    |
| ASTM C150   | 1999a         | Standard Specification for Portland Cement   | TX 7-685-927                    |
| ASTM C177   | 1997          | Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus | TX 4-811-646                    |
| ASTM C236   | 1989(1993)e 1 | Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box                               | TX 3-972-350                    |
| ASTM C330   | 1999          | Standard Specification for Lightweight Aggregates for Structural Concrete  | TX 5-008-019                    |
| ASTM C509   | 1984          | Standard Specification for Cellular Elastomeric Preformed Gasket and Sealing Material  | TX 2-210-202                    |
| ASTM C516   | 1980(1996)e 1 | Standard Specification for Vermiculite Loose Fill Thermal Insulation   | TX 4-571-119                    |
| ASTM C518   | 1991          | Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus   | TX 3-278-409                    |
| ASTM C549   | 1981(1995)e 1 | Standard Specification for Perlite Loose Fill Insulation   | TX 4-584-449                    |
| ASTM C564   | 1970(1982)    | Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings   | TX 696-452                      |
| ASTM C720   | 1989(1994)e 1 | Standard Specification for Spray Applied Fibrous Insulation for Elevated Temperature   | TX 4-391-188                    |
| ASTM D86    | 2007          | Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure  | TX 7-685-941                    |
| ASTM D129   | 1995          | Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)  | TX 4-862-934                    |
| ASTM D257   | 1991          | Standard Test Method for DC Resistance of Conductance of Insulating Materials  | TX 3-506-922                    |
| ASTM D287   | 1992(1995)    | Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)   | TX 4-623-459                    |
| ASTM D323   | 1958(1968)    | Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)  |                                 |
| ASTM D388   | 1998a         | Standard Classification of Coals by Rank   | TX 4-951-524                    |
| ASTM D396   | 1998          | Standard Specification for Fuel Oils   | TX 4-862-934                    |
| ASTM D413   | 1982(1993)e 1 | Standard Test Method for Rubber Property--Adhesion to Flexible Substrate   | TX 4-320-184                    |
| ASTM D512   | 1989(1999)    | Standard Test Methods for Chloride Ion In Water  | TX 5-785-473                    |

| Designation | Edition       | Title   | Registration Certificate Number |
|-------------|---------------|---|---------------------------------|
| ASTM D611   | 1982(1998)    | Standard Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents  | TX 4-862-934                    |
| ASTM D665   | 1998e 1       | Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water  | TX 4-862-934                    |
| ASTM D814   | 1995          | Standard Test Method for Rubber Property--Vapor Transmission of Volatile Liquids  | TX 4-320-184                    |
| ASTM D975   | 1998b         | Standard Specification for Diesel Fuel Oils   | TX 4-862-934                    |
| ASTM D975   | 2007          | Standard Specification for Diesel Fuel Oils   | TX 7-685-915                    |
| ASTM D976   | 1991(1995)e 1 | Standard Test Methods for Calculated Cetane Index of Distillate Fuels   | TX 4-623-459                    |
| ASTM D1072  | 1990(1994)e 1 | Standard Test Method for Total Sulfur in Fuel Gases   | TX 4-768-933                    |
| ASTM D1193  | 1977(1983)    | Standard Specification for Reagent Water  | TX 1-374-250                    |
| ASTM D1217  | 1993(1998)    | Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer   | TX 4-862-934                    |
| ASTM D1246  | 1995(1999)    | Standard Test Method for Bromide Ion in Water   | TX 5-345-022                    |
| ASTM D1253  | 1986(1996)    | Standard Test Method for Residual Chlorine in Water   | TX 5-345-022                    |
| ASTM D1266  | 1998          | Standard Test Method for Sulfur in Petroleum Products (Lamp Method)   | TX 4-862-934                    |
| ASTM D1298  | 1999          | Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method | TX 5-071-596                    |
| ASTM D1335  | 1967(1972)    | Standard Method of Test for Tuft Bind of Pile Floor Coverings   | TX 626-132                      |
| ASTM D1412  | 1993(1997)    | Standard Test Method for Equilibrium Moisture of Coal at 96 to 97 Percent Relative Humidity and 30 Degrees Celsius  | TX 4-768-933                    |
| ASTM D1415  | 1988(1994)    | Standard Practice for Rubber Property- International Hardness   | TX 4-320-184                    |
| ASTM D1480  | 1993(1997)    | Standard Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by Bingham Pycnometer   | TX 4-623-459                    |
| ASTM D1481  | 1993(1997)    | Standard Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by Lipkin Bicapillary Pycnometer                              | TX 4-623-459                    |
| ASTM D1518  | 1985(1998)e1  | Standard Test Method for Thermal Transmittance of Textile Materials   | TX 2-469-775                    |
| ASTM D1535  | 1989          | Standard Test Method for Specifying Color by the Munsell System   | TX 4-898-491                    |
| ASTM D1552  | 1995          | Standard Test Method for Sulfur in Petroleum Products (High-Temperature Method)   | TX 4-623-459                    |
| ASTM D1687  | 1992(1996)    | Standard Test Methods for Chromium in Water   | TX 5-345-022                    |
| ASTM D1688  | 1995          | Standard Test Methods for Copper in Water   | TX 5-345-022                    |
| ASTM D1785  | 1986          | Standard Specification for Poly (Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120   | TX 2-284-674                    |
| ASTM D1835  | 1997          | Standard Specification for Liquefied Petroleum (LP) Gases   | TX 4-623-459                    |
| ASTM D1890  | 1996          | Standard Test Method for Beta Particle Radioactivity of Water   | TX 5-369-432                    |
| ASTM D1943  | 1996          | Standard Test Method for Alpha Particle Radioactivity of Water  | TX 5-369-432                    |
| ASTM D1945  | 1996          | Standard Test Method for Analysis of Natural Gas By Gas Chromatography  | TX 4-768-933                    |
| ASTM D1946  | 1990(1994)e 1 | Standard Practice for Analysis of Reformulated Gas by Gas Chromatography  | TX 4-768-933                    |
| ASTM D2013  | 1986(1994)    | Standard Method of Preparing Coal Samples for Analysis  | TX 4-768-933                    |

| Designation | Edition     | Title  | Registration Certificate Number |
|-------------|-------------|--|---------------------------------|
| ASTM D2015  | 1996        | Standard Test Method for Gross Calorific Value of Coal and Coke by the Adiabatic Bomb Calorimeter  | TX 4-768-933                    |
| ASTM D2036  | 1998        | Standard Test Method for Cyanides in Water   | TX 5-369-432                    |
| ASTM D2163  | 1991(1996)  | Standard Test Method for Analysis of Liquefied Petroleum (LP) Gases and Propane Concentrates by Gas Chromatography                         | TX 4-623-459                    |
| ASTM D2216  | 1998        | Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass                                     | TX 5-929-602                    |
| ASTM D2234  | 1998        | Standard Practice for Collection of a Gross Sample of Coal   | TX 4-951-524                    |
| ASTM D2247  | 1968(1973)  | Standard Method for Testing Coated Metal Specimens at 100 Percent Relative Humidity  | TX 648-346                      |
| ASTM D2460  | 1997        | Standard Test Method for Alpha-Particle-Emitting Isotopes of Radium in Water   | TX 5-369-432                    |
| ASTM D2502  | 1992(1996)  | Standard Test Method for Estimation of Molecular Weight (Relative Molecular Mass) of Petroleum Oils from Viscosity Measurements            | TX 4-623-459                    |
| ASTM D2503  | 1992(1997)  | Standard Test Method for Relative Molecular Mass (Molecular Weight) of Hydrocarbons by Thermoelectric Measurement of Vapor Pressure        | TX 4-623-459                    |
| ASTM D2505  | 1988(1998)  | Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography                    | TX 4-862-934                    |
| ASTM D2597  | 1994(1999)  | Standard Test Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography | TX 5-071-596                    |
| ASTM D2622  | 1998        | Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry                             | TX 5-071-596                    |
| ASTM D2724  | 1987(1995)  | Standard Test Methods for Bonded, Fused, and Laminated Apparel Fabrics   | TX 5-435-937                    |
| ASTM D2777  | 1998        | Standard Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D-19 on Water                            | TX 5-345-022                    |
| ASTM D2879  | 1997        | Standard Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope          | TX 5-345-022                    |
| ASTM D2908  | 1974        | Standard Recommended Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography                       | TX 534-158                      |
| ASTM D2986  | 1995a(1999) | Standard Practice for Evaluation of Air, Assay Media by the Monodisperse DOP (Diocetyl Phthalate) Smoke Test                               | TX 5-202-199                    |
| ASTM D3120  | 1996        | Standard Test Method for Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry                    | TX 4-623-459                    |
| ASTM D3173  | 1987(1996)  | Standard Test Method for Moisture in the Analysis Sample of Coal and Coke  | TX 4-951-524                    |
| ASTM D3176  | 1989(1997)  | Standard Practice for Ultimate Analysis of Coal and Coke   | TX 4-951-524                    |
| ASTM D3177  | 1989(1997)  | Standard Test Methods for Total Sulfur in the Analysis Sample of Coal and Coke   | TX 4-951-524                    |
| ASTM D3178  | 1989(1997)  | Standard Test Methods for Carbon and Hydrogen in the Analysis Sample of Coal and Coke  | TX 4-951-524                    |
| ASTM D3236  | 1988(1999)  | Standard Test Method for Apparent Viscosity of Hot Metal Adhesives and Coating Materials   | TX 5-071-596                    |
| ASTM D3246  | 1996        | Standard Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry  | TX 5-071-596                    |
| ASTM D3286  | 1996        | Standard Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter   | TX 4-951-524                    |

| Designation | Edition       | Title   | Registration Certificate Number |
|-------------|---------------|---|---------------------------------|
| ASTM D3371  | 1995          | Standard Test Method for Nitriles in Aqueous Solution by Gas-Liquid Chromatography  | TX 4-257-410                    |
| ASTM D3454  | 1997          | Standard Test Method for Radium-226 in Water  | TX 5-369-432                    |
| ASTM D3588  | 1998          | Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels                                       | TX 4-951-524                    |
| ASTM D3697  | 1992(1996)    | Standard Test Method for Antimony in Water  | TX 4-257-533                    |
| ASTM D4057  | 1995e 1       | Standard Practice for Manual Sampling of Petroleum and Petroleum Products   | TX 4-622-434                    |
| ASTM D4084  | 1994          | Standard Test Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method)  | TX 4-768-933                    |
| ASTM D4177  | 1995          | Standard Practice for Automatic Sampling of Petroleum and Petroleum Products  | TX 4-622-434                    |
| ASTM D4239  | 1997e 1       | Standard Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High Temperature Tube Furnace Combustion Methods                   | TX 4-951-524                    |
| ASTM D4268  | 1993          | Standard Test Method for Testing Fiber Ropes  | TX 5-435-937                    |
| ASTM D4294  | 1998          | Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry                          | TX 4-898-490                    |
| ASTM D4329  | 1999          | Standard Practice for Fluorescent UV Exposure of Plastics   | TX 5-996-821                    |
| ASTM D4420  | 1994          | Standard Test Method for Determination of Aromatics in Finished Gasoline by Gas Chromatography  | TX 4-622-434                    |
| ASTM D4809  | 1995          | Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)                                    | TX 4-622-434                    |
| ASTM D4891  | 1989(1994)E 1 | Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion   | TX 4-951-524                    |
| ASTM D4986  | 1998          | Standard Test Method for Horizontal Burning Characteristics of Cellular Polymeric Materials   | TX 5-570-786                    |
| ASTM D5257  | 1997          | Standard Test Method for Dissolved Hexavalent Chromium in Water by Ion Chromatography   | TX 5-345-022                    |
| ASTM D5373  | 1993(1997)    | Standard Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal and Coke                          | TX 4-951-524                    |
| ASTM D5489  | 1996a         | Standard Guide for Care Symbols for Care Instructions Textile Products  | TX 4-394-571                    |
| ASTM D5673  | 1996          | Standard Test Method for Elements in Water by Inductively Coupled Plasma- Mass Spectrometry   | TX 5-369-432                    |
| ASTM D5865  | 1998a         | Standard Test Method for Gross Calorific Value of Coal and Coke   | TX 4-951-524                    |
| ASTM D6216  | 1998          | Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications                             | TX 5-202-199                    |
| ASTM D6228  | 1998          | Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Photometric Detection | TX 4-951-524                    |
| ASTM D6420  | 1999          | Standard Test Method for Determination of Gaseous Organic Compounds by Direct Interface Gas Chromatography-Mass Spectrometry                      | TX 5-202-199                    |
| ASTM D6503  | 1999          | Standard Test Method for Enterococci in Water Using Enterolert  | TX 5-369-432                    |
| ASTM E11    | 1995          | Standard Specification for Wire Cloth and Sieves for Testing Purposes   | TX 5-135-299                    |
| ASTM E23    | 1982          | Standard Test Methods for Notched Bar Impact Testing of Metallic Materials  | TX 1-187-015                    |

| Designation | Edition       | Title  | Registration Certificate Number |
|-------------|---------------|--|---------------------------------|
| ASTM E29    | 1993a         | Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications   | TX 4-143-803                    |
| ASTM E29    | 1990          | Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications   | TX 3-460-670                    |
| ASTM E72    | 1980          | Standard Methods of Conducting Strength Tests of Panels for Building Construction  | TX 3-972-350                    |
| ASTM E96    | 1995          | Standard Test Methods for Water Vapor Transmission of Materials  | TX 4-391-188                    |
| ASTM E145   | 1994e 1       | Standard Specification for Gravity-Convection and Forced- Ventilation Ovens  | TX 4-952-491                    |
| ASTM E154   | 1968(1979)e 1 | Standard Methods of Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces   | TX 2-210-197                    |
| ASTM E168   | 1988          | Standard Practices for General Techniques of Infrared Quantitative Analysis  | TX 3-211-547                    |
| ASTM E169   | 1987          | Standard Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis   | TX 3-211-547                    |
| ASTM E185   | 1982          | Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels   | TX 1-210-036                    |
| ASTM E260   | 1996          | Standard Practice for Packed Column Gas Chromatography   | TX 5-202-197                    |
| ASTM E283   | 1991(1999)    | Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen | TX 5-202-198                    |
| ASTM E408   | 1971          | Standard Methods of Test for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques  | TX 565-130                      |
| ASTM E424   | 1971          | Standard Methods of Test for Solar Energy Transmittance and Reflectance (Terrestrial) of Sheet Materials   | TX 565-130                      |
| ASTM E606   | 1980          | Standard Recommended Practice for Constant-Amplitude Low-Cycle Fatigue Testing   | TX 1-187-015                    |
| ASTM E681   | 1985          | Standard Test Method for Concentration Limits of Flammability of Chemicals   | TX 2-794-050                    |
| ASTM E695   | 1979(1997)e 1 | Standard Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading   | TX 5-641-809                    |
| ASTM E711   | 1987(1992)    | Standard Test Method for Gross Calorific Value of Refuse-Derived Fuel by the Bomb Calorimeter  | TX 3-689-742                    |
| ASTM E773   | 1997          | Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units   | TX 5-202-198                    |
| ASTM E774   | 1997          | Standard Specifications for the Classification of the Durability of Sealed Insulating Glass Units  | TX 5-202-198                    |
| ASTM E775   | 1987(1992)    | Standard Test Methods for Total Sulfur in the Analysis Sample of Refuse-Derived Fuel   | TX 3-689-742                    |
| ASTM E776   | 1987(1992)    | Standard Test Method for Forms of Chlorine in Refuse-Derived Fuel  | TX 3-689-742                    |
| ASTM E885   | 1988          | Standard Test Methods for Analyses of Metals in Refuse-Derived Fuel by Atomic Absorption Spectroscopy  | TX 3-689-742                    |
| ASTM E1337  | 1990(1996)    | Standard Test Method for Determining Longitudinal Peak Braking Coefficient of Paved Surfaces Using a Standard Reference Test Tire                                    | TX 5-369-425                    |

| Designation | Edition       | Title  | Registration Certificate Number |
|-------------|---------------|--|---------------------------------|
| ASTM E1625  | 1994          | Standard Test Method for Determining Biodegradability of Organic Chemicals in Semi-Continuous Activated Sludge (SCAS)                | TX 4-780-430                    |
| ASTM E1719  | 1997          | Standard Test Method for Vapor Pressure of Liquids by Ebulliometry   | TX 4-755-309                    |
| ASTM F462   | 1979(1999)    | Standard Consumer Safety Specification for Slip-Resistant Bathing Facilities   | TX 5-641-808                    |
| ASTM F478   | 1992(1999)    | Standard Specification for In-Service Care of Insulating Line Hose and Covers  | TX 5-139-661                    |
| ASTM F631   | 1980(1985)    | Standard Method for Testing Full Scale Advancing Spill Removal Devices   | TX 4-780-430                    |
| ASTM F631   | 1993          | Standard Guide for Collecting Skimmer Performance Data in Controlled Environments  | TX 4-780-430                    |
| ASTM F682   | 1982a(1988)   | Standard Specification for Wrought Carbon Steel Sleeve-Type Pipe Couplings   | TX 3-278-410                    |
| ASTM F715   | 1981(1986)    | Standard Methods of Testing Spill Control Barrier Membrane Materials   | TX 3-689-742                    |
| ASTM F715   | 1995          | Standard Test Methods for Coated Fabrics Used for Oil Spill Control and Storage  | TX 4-780-430                    |
| ASTM F722   | 1982(1988)    | Standard Specification for Welded Joints for Shipboard Piping Systems  | TX 3-278-410                    |
| ASTM F808   | 1983(1988)e 1 | Standard Guide for Collecting Skimmer Performance Data in Uncontrolled Environments  | TX 3-689-742                    |
| ASTM F1003  | 1986(1992)    | Standard Specification for Searchlights on Motor Lifeboats   | TX 4-862-629                    |
| ASTM F1006  | 1986(1997)    | Standard Specification for Entrainment Separators for Use in Marine Piping Applications  | TX 4-862-629                    |
| ASTM F1007  | 1986(1996)e 1 | Standard Specification for Pipe-Line Expansion Joints of the Packed Slip Type for Marine Application                                 | TX 4-862-629                    |
| ASTM F1014  | 1992          | Standard Specification for Flashlights on Vessels  | TX 4-862-629                    |
| ASTM F1020  | 1986(1996)e 1 | Standard Specification for Line-Blind Valves for Marine Applications   | TX 4-862-629                    |
| ASTM F1120  | 1987(1998)    | Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications                                   | TX 4-862-629                    |
| ASTM F1121  | 1987(1998)    | Standard Specification for International Shore Connections for Marine Fire Applications  | TX 4-862-629                    |
| ASTM F1122  | 1987(1998)    | Standard Specification for Quick Disconnect Couplings  | TX 4-862-629                    |
| ASTM F1123  | 1987(1998)    | Standard Specification for Non-Metallic Expansion Joints   | TX 4-862-629                    |
| ASTM F1139  | 1988(1998)    | Standard Specification for Steam Traps and Drains  | TX 4-862-629                    |
| ASTM F1155  | 1998          | Standard Practice for Selection and Application of Piping System Materials   | TX 4-862-629                    |
| ASTM F1172  | 1988(1998)    | Standard Specification for Fuel Oil Meters of the Volumetric Positive Displacement Type  | TX 4-862-629                    |
| ASTM F1173  | 1995          | Standard Specification for Thermosetting Resin Fiberglass Pipe and Fittings to be Used for Marine Applications                       | TX 4-862-629                    |
| ASTM F1196  | 1994          | Standard Specification for Sliding Watertight Door Assemblies  | TX 4-862-629                    |
| ASTM F1197  | 1989(1994)e 1 | Standard Specification for Sliding Watertight Door Control Systems   | TX 4-862-629                    |
| ASTM F1199  | 1988(1998)    | Standard Specification for Cast (All Temperatures and Pressures) and Welded Pipe Line Strainers (150 psig and 150 Degrees F Maximum) | TX 4-862-629                    |
| ASTM F1200  | 1988(1998)    | Standard Specification for Fabricated (Welded) Pipe Line Strainers (Above 150 psig and 150°F)  | TX 4-862-629                    |
| ASTM F1201  | 1988(1998)    | Standard Specification for Fluid Conditioner Fittings in Piping Applications Above Zero Degrees F                                    | TX 4-862-629                    |

| Designation        | Edition       | Title  | Registration Certificate Number |
|--------------------|---------------|--|---------------------------------|
| ASTM F1271         | 1990(1995)e 1 | Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment   | TX 4-862-629                    |
| ASTM F1273         | 1991(1996)e 1 | Standard Specification for Tank Vent Flame Arresters   | TX 4-862-629                    |
| ASTM F1321         | 1992          | Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment) to Determine Light Ship Displacement and Centers of Gravity of a Vessel | TX 4-862-629                    |
| ASTM F1323         | 1998          | Standard Specification for Shipboard Incinerators  | TX 4-862-629                    |
| ASTM F1471         | 1993          | Standard Test Method for Air Cleaning Performance of a High-Efficiency Particulate Air-Filter System   | TX 3-936-504                    |
| ASTM F1546/F 1546M | 1996          | Standard Specification for Fire Hose Nozzles   | TX 4-862-629                    |
| ASTM F1548         | 1994          | Standard Specification for the Performance of Fittings for Use with Gasketed Mechanical Couplings Used in Piping Applications  | TX 4-862-629                    |
| ASTM F1951         | 1999          | Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment   | TX 5-641-808                    |
| ASTM G21           | 1990          | Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi   | TX 4-143-803                    |
| ASTM G151          | 1997          | Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources   | TX 4-755-309                    |
| ASTM G154          | 2000a         | Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials   | TX 4-952-491                    |
| ASTM F747          | 1997          | Standard Terminology Relating to Amusement Rides and Devices   | TX 5-641-808                    |
| ASTM F1193         | 2006          | Standard Practice for Quality, Manufacture, and Construction of Amusement Rides and Devices  | TX 7-685-943                    |
| ASTM F1950         | 1999          | Standard Specification for Physical Information to be Transferred With Used Amusement Rides and Devices  | TX 5-641-808                    |
| ASTM F1957         | 1999          | Standard Test Method for Composite Foam Hardness Durometer Hardness  | TX 5-641-808                    |

# EXHIBIT B

## NATIONAL FIRE PROTECTION ASSOCIATION, INC. COPYRIGHT REGISTRATIONS

| Designation | Edition | Title   | Registration Certificate Number |
|-------------|---------|---|---------------------------------|
| NFPA 1      | 2003    | Uniform Fire Code   | TX 5-970-602                    |
| NFPA 1      | 2006    | Uniform Fire Code   | TX 6-261-668                    |
| NFPA 11     | 2005    | Standard for Low Medium and High Expansion Foam   | TX 6-160-768                    |
| NFPA 12     | 2005    | Standard on Carbon Dioxide Extinguishing Systems  | TX 6-232-876                    |
| NFPA 10     | 2002    | Standard for Portable Fire Extinguishers (Title of work on certificate of registration is "National Fire Codes Vol. 1-12 and Master Index")                                   | TX 5-752-623                    |
| NFPA 13     | 2002    | Installation of Sprinkler Systems (Title of work on certificate of registration is "National Fire Codes Vol. 1-12 and Master Index")  | TX 5-752-623                    |
| NFPA 25     | 2002    | Inspection, Testing and Maintenance of Water-Based Fire Protection Systems (Title of work on certificate of registration is "National Fire Codes Vol. 1-12 and Master Index") | TX 5-752-623                    |
| NFPA 30     | 2003    | Flammable and Combustible Liquids Code  | TX 5-905-038                    |
| NFPA 54     | 2006    | National Fuel Gas Code  | TX 6-261-666                    |
| NFPA 58     | 2001    | Liquefied Petroleum Gas Code (Title of work on certificate of registration is "National Fire Codes Vol 3")  | TX 5-401-672                    |
| NFPA 58     | 2004    | Liquefied Petroleum Gas Code  | TX 5-956-112                    |
| NFPA 59     | 2004    | Utility LP Gas Plant Code   | TX 5-953-205                    |
| NFPA 70     | 1999    | National Electrical Code  | TX 4-092-419                    |
| NFPA 70     | 2005    | National Electrical Code  | TX 6-108-410                    |
| NFPA 70     | 2008    | National Electrical Code  | TX 6-966-113                    |
| NFPA 70     | 2011    | National Electrical Code  | TX 7-297-325                    |
| NFPA 72     | 2002    | National Fire Alarm Code  | TX 5-841-133                    |
| NFPA 99     | 2005    | Health Care Facilities Code   | TX 6-153-939                    |
| NFPA 101    | 2000    | Life Safety Code  | TX 5-371-918                    |
| NFPA 101    | 2003    | Life Safety Code  | TX 5-841-134                    |
| NFPA 101    | 2006    | Life Safety Code  | TX 6-294-334                    |
| NFPA 704    | 2007    | Standard System for the Identification of the Hazards of Materials for Emergency Response   | TX 6-445-855                    |

# EXHIBIT C

| Designation            | Edition | Title   | Registration Certificate Number |
|------------------------|---------|---|---------------------------------|
| ANSI/ASHRAE/IES 90.1   | 2010    | ANSI/ASHRAE/IESNA Standard 90 1-2010, Energy Standard for Buildings Except for Low-Rise Residential Buildings (I-P Edition) | TX 7-299-602                    |
| ANSI/ASHRAE/IESNA 90.1 | 2007    | ANSI/ASHRAE/IESNA Standard 90 1-2007, Energy Standard for Buildings Except for Low-Rise Residential Buildings (I-P Edition) | TX 6-842-936                    |
| ANSI/ASHRAE/IESNA 90.1 | 2004    | ANSI/ASHRAE/IESNA Standard 90 1-2004, Energy Standard for Buildings Except for Low-Rise Residential Buildings (I-P Edition) | TX 6-091-449                    |
| ASHRAE Handbook        | 1993    | 1993 ASHRAE Handbook: Fundamentals (I-P Edition)  | TX 3-832-628                    |

# EXHIBIT G



# CERTIFICATE

## By Authority Of THE UNITED STATES OF AMERICA Legally Binding Document

By the Authority Vested By Part 5 of the United States Code § 552(a) and Part 1 of the Code of Regulations § 51 the attached document has been duly INCORPORATED BY REFERENCE and shall be considered legally binding upon all citizens and residents of the United States of America. HEED THIS NOTICE: Criminal penalties may apply for noncompliance.



**Document Name:** ASTM D4239: Standard Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High Temperature  
**CFR Section(s):** Tube Furnace Combustion Methods  
40 CFR 60, Appendix A-7

**Standards Body:** American Society for Testing and Materials



Official Incorporator:

THE EXECUTIVE DIRECTOR  
OFFICE OF THE FEDERAL REGISTER  
WASHINGTON, D.C.



Designation: D 4239 – 97<sup>ε1</sup>

## Standard Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High-Temperature Tube Furnace Combustion Methods<sup>1</sup>

This standard is issued under the fixed designation D 4239; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—Section 18.4 has been editorially corrected in June 1999.

### 1. Scope

1.1 These test methods cover three alternative procedures using high-temperature tube furnace combustion methods for the rapid determination of sulfur in samples of coal and coke.

1.2 These test methods appear in the following order:

#### Sections

|  |       |
|--|-------|
| Method A—High-Temperature Combustion Method with Acid Base Titration Detection Procedures  | 6-9   |
| Method B—High-Temperature Combustion Method with Iodimetric Titration Detection Procedures | 10-13 |
| Method C—High-Temperature Combustion Method with Infra-red Absorption Detection Procedures | 14-16 |

1.2.1 When automated equipment is used to perform any of the three methods of this test method, the procedures can be classified as instrumental methods. There are several manufacturers that offer to the coal industry equipment with instrumental analysis capabilities for the determination of the sulfur content of coal and coke samples.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. See 7.8 and 15.2.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- D 346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis<sup>2</sup>
- D 1193 Specification for Reagent Water<sup>3</sup>
- D 2013 Method of Preparing Coal Samples for Analysis<sup>2</sup>
- D 2361 Test Method for Chlorine in Coal<sup>2</sup>
- D 3173 Test Method for Moisture in the Analysis Sample of Coal and Coke<sup>2</sup>
- D 3176 Practice for Ultimate Analysis of Coal and Coke<sup>2</sup>
- D 3180 Practice for Calculating Coal and Coke Analyses from As-Determined to Different Bases<sup>2</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-5 on Coal and Coke and is the direct responsibility of Subcommittee D05.21 on Methods of Analysis.

Current edition approved June 10, 1997. Published May 1998. Originally published as D 4239 – 83. Last previous edition D 4239 – 94.

<sup>2</sup> Annual Book of ASTM Standards, Vol 05.05.

<sup>3</sup> Annual Book of ASTM Standards, Vol 11.01.

D 4208 Test Method for Total Chlorine in Coal by the Oxygen Bomb Combustion/Ion Selective Electrode Method<sup>2</sup>

D 4621 Guide for Accountability and Quality Control in the Coal Analysis Laboratory<sup>2</sup>

D 5142 Test Methods for the Proximate Analysis of the Analysis Sample of Coal and Coke by Instrumental Procedures<sup>2</sup>

### 3. Summary of Test Methods

3.1 *Method A—High-Temperature Combustion Method with Acid-Base Titration Detection Procedures*—A weighed sample is burned in a tube furnace at a minimum operating temperature of 1350°C in a stream of oxygen. During combustion, all sulfur contained in the sample is oxidized to gaseous oxides of sulfur (sulfur dioxide, SO<sub>2</sub>, and sulfur trioxide, SO<sub>3</sub>) and the chlorine in the sample is released as Cl<sub>2</sub>. These products are then absorbed into a solution of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) where they dissolve forming dilute solutions of sulfuric (H<sub>2</sub>SO<sub>4</sub>) and hydrochloric (HCl) acids. The quantities of both acids produced are directly dependent upon the amounts of sulfur and chlorine present in the original coal sample. Once the amounts of each acid present have been determined, the percentage of sulfur contained in the coal may be calculated.

3.1.1 This method is written to include commercially available sulfur analyzers that must be calibrated with appropriate standard reference materials (SRMs) to establish recovery factors or a calibration curve based on the range of sulfur in the coal or coke samples being analyzed.

NOTE 1—Elements ordinarily present in coal do not interfere in Method A (3.1), with the exception of chlorine; results must be corrected for chlorine content of the samples (9.1).

3.2 *Method B—High-Temperature Combustion Method with Iodimetric Detection Procedures*—A weighed sample is burned in a tube furnace at a minimum operating temperature of 1350°C in a stream of oxygen to ensure the oxidation of sulfur. The combustion products are absorbed in an aqueous solution that contains iodine. When sulfur dioxide is scrubbed by the diluent, the trace iodine originally present in the solution is reduced to iodide, thus causing an increase in resistance. The detection system of the instrument consists of a polarized dual platinum electrode. Any change in resistance of the solution in

the vessel is detected. Iodine titrant is then added proportionally to the reaction vessel until the trace excess of iodine is replenished and the solution resistance is reduced to its initial level. The volume of titrant expended is used to calculate the sulfur concentration of the sample. The method is empirical; therefore, the apparatus must be calibrated by the use of standard reference material (SRM).

3.2.1 This method is designed to be used with commercially available sulfur analyzers, equipped to perform the preceding operation automatically, and must be calibrated with an appropriate sample (5.4) based on the range of sulfur in each coal or coke sample analyzed.

NOTE 2—Nonautomatic systems may be used with the titration procedures and calculations performed manually by qualified laboratory technicians. The resulting loss in accuracy or speed, or both, would then negate the advantages of using the fully automated instrumental approach.

3.3 *Method C—High-Temperature Combustion Method with Infrared Absorption Detection Procedures*—The sample is burned in a tube furnace at a minimum operating temperature of 1350°C in a stream of oxygen to oxidize the sulfur. Moisture and particulates are removed from the gas by traps filled with anhydrous magnesium perchlorate. The gas stream is passed through a cell in which sulfur dioxide is measured by an infrared (IR) absorption detector. Sulfur dioxide absorbs IR energy at a precise wavelength within the IR spectrum. Energy is absorbed as the gas passes through the cell body in which the IR energy is being transmitted: thus, at the detector, less energy is received. All other IR energy is eliminated from reaching the detector by a precise wavelength filter. Thus, the absorption of IR energy can be attributed only to sulfur dioxide whose concentration is proportional to the change in energy at the detector. One cell is used as both a reference and a measurement chamber. Total sulfur as sulfur dioxide is detected on a continuous basis. This method is empirical; therefore, the apparatus must be calibrated by the use of SRMs.

3.3.1 This method is for use with commercially available sulfur analyzers equipped to carry out the preceding operations automatically and must be calibrated using standard reference material (coal) of known sulfur content based on the range of sulfur in each coal or coke sample analyzed.

#### 4. Significance and Use

4.1 Determination of sulfur is, by definition, part of the ultimate analysis of coal.

4.2 Results of the sulfur analysis are used to serve a number of interests: evaluation of coal preparation, evaluation of potential sulfur emissions from coal combustion or conversion processes, and evaluation of the coal quality in relation to contract specifications, as well as other scientific purposes.

4.3 The instrumental analysis provides a reliable, rapid method for determining the concentration of sulfur in a lot of coal or coke and are especially applicable when results must be obtained rapidly for the successful completion of industrial, beneficiation, trade, or other evaluations.

#### 5. Sample

5.1 The sample shall be the material pulverized to pass No. 60 (250- $\mu$ m) sieve and mixed thoroughly in accordance with Method D 2013 or Practice D 346.

NOTE 3—It may be difficult to meet the precision statements of Section 18 when high mineral content coals are ground to pass 60 mesh. When the precision of analysis required cannot be obtained, it is recommended that the coals be ground to pass through a No. 100 (150- $\mu$ m) sieve. The reduced particle size should result in a more homogeneous sample.

5.2 A separate portion of the analysis sample should be analyzed for moisture content in accordance with Test Method D 3173, so that calculation to other than the as-determined basis can be made.

5.3 Procedures for converting as-determined sulfur values obtained from the analysis sample to other bases are described in Practices D 3176 and D 3180.

5.4 Standard Reference Material (SRM) such as SRM Nos. 2682 through 2685—*Sulfur in Coal*<sup>4</sup> which consist of four different coals that have been individually crushed and ground to pass a 60-mesh sieve, and bottled in 50-g units, or other commercially available reference coals with a certified sulfur content.

### METHOD A—HIGH-TEMPERATURE COMBUSTION METHOD WITH ACID-BASE TITRATION DETECTION PROCEDURES<sup>5</sup>

#### 6. Apparatus

6.1 *Tube Furnace*—Capable of heating 150- to 175-mm area (hot zone) of the combustion tube (6.2) to at least 1350°C. It is usually heated electrically using resistance rods, a resistance wire, or molybdenum disilicide elements. Specific dimensions may vary with manufacturer's design.

NOTE 4—Induction furnace techniques may be used provided it can be shown that they meet the precision requirements of Section 18.

6.2 *Combustion Tube*—Approximately 28-mm internal diameter with a 3-mm wall thickness and 750 mm in length made of porcelain, zircon, or mullite. It must be gastight at working temperature. The combustion may be carried out in a tapered-end tube that is closely connected to the gas absorber by high temperature tubing with gastight joints. Acceptable configurations include connecting the tapered-end tube directly to the elbow of the fritted gas bubbler or to a 10/30, standard taper-ground joint that is attached to a heat resistant glass right angle bend. The temperature at the tapered end of the tube should be maintained high enough to prevent condensation in the tube itself.

6.2.1 Alternatively, a high-temperature straight refractory tube may be used, if available. It requires a silica adaptor (6.11) with a flared end that fits inside the combustion tube and serves as an exit for the gases.

6.3 *Flowmeter*, for measuring an oxygen flow rate up to 2.0 L/min.

6.4 *Sample Combustion Boats*, must be made of iron-free material and of a convenient size suitable for the dimensions of

<sup>4</sup> Available from the Office of Standard Reference Materials, Room B314, Chemistry Bldg., National Bureau of Standards, Washington, DC 20234.

<sup>5</sup> Based on the method of Mott, R. A., and Wilkinson, H. C., "Determination of Sulfur in Coal and Coke by the Sheffield High Temperature Method," *Fuel*, Fuel B, Vol. 35, 1956, p. 6. This method is designed for the rapid determination of sulfur in coal and coke. It is not applicable to coals or coal density fractions that have been subjected to treatment with chlorinated hydrocarbons because of the potentially high acidity of the combustion gases.

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

AMERICAN SOCIETY FOR TESTING  
AND MATERIALS d/b/a/ ASTM  
INTERNATIONAL,  
100 Barr Harbor Drive,  
West Conshohocken, PA 19428;

NATIONAL FIRE PROTECTION  
ASSOCIATION, INC.,  
1 Batterymarch Park,  
Quincy, MA 02169; and

AMERICAN SOCIETY OF HEATING,  
REFRIGERATING, AND AIR-  
CONDITIONING ENGINEERS, INC.  
1791 Tullie Circle, N.E.,  
Atlanta, GA 30329

Plaintiffs,

v.

PUBLIC.RESOURCE.ORG, INC.,  
1005 Gravenstein Hwy. North,  
Sebastopol, CA 95472

Defendant.

Civil Action No. \_\_\_\_\_

**COMPLAINT FOR INJUNCTIVE RELIEF**

**COMPLAINT**

This is an action by three not-for-profit standards developing organizations: American Society for Testing and Materials d/b/a ASTM International; National Fire Protection Association, Inc.; and American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (collectively “Plaintiffs”). This action seeks injunctive relief for copyright infringement, contributory copyright infringement and trademark infringement against Public.Resource.Org, Inc. (“Public Resource” or “Defendant”), an organization that seeks to

destroy clearly established copyright protection for Plaintiffs' standards that various governments have incorporated by reference into regulations. Plaintiffs, by their attorneys, allege as follows:

### **INTRODUCTION**

1. Standards are technical works that encourage consistent practices among private actors. The goals of standards include advancing public safety, ensuring compatibility across products and services, facilitating training and spurring innovation. In the United States, standards are typically developed by private organizations with expertise in the subject matter the standard addresses. The resulting standards are original works containing creative content which are protected from infringement under the Copyright Act. Government entities frequently incorporate these private standards by reference in statutes, regulations, or ordinances.

2. This established system of private standards development in the United States yields great public benefits. In the modern era, standards are necessary for a well-functioning economy and a safe society. The development of standards by private organizations allows for private actors to bear the significant costs of creating standards, through processes and procedures that incorporate a diverse array of viewpoints and interests and draw on the knowledge of numerous experts. Moreover, this system imposes virtually no costs on governments or taxpayers, while enabling government entities at every level to incorporate private standards into their regulations or statutes as they see fit—subject to the creators of the standards retaining the copyrights in the standards. Plaintiffs underwrite—either entirely or in substantial part—the costs they incur in creating the standards through the revenues derived from the sales or licensing of their copyright-protected standards. At the same time, as detailed herein, each Plaintiff has developed policies for providing interested members of the public access to standards known to have been incorporated by reference into statutes and regulations.

3. The Defendant in this action, Public.Resource.Org, Inc. (“Public Resource”), has engaged in conduct that violates U.S. copyright and trademark law and threatens to undermine the many significant benefits of private standards development. Public Resource has copied en masse Plaintiffs’ copyrighted standards in their entirety, posted them to its public website, and encouraged the public to disregard Plaintiffs’ copyrights and to copy, distribute, and create derivative works of those standards at will. Public Resource’s bulk copying of Plaintiffs’ standards is not supported by, and in fact violates, the Copyright Act. And Public Resource’s actions threaten the substantial public benefits, including safety, efficiency and cost savings, that result from Plaintiffs’ ownership and exploitation of their copyrights in the standards they create.

#### **THE PARTIES**

4. Plaintiff American Society for Testing and Materials d/b/a ASTM International (“ASTM”) is a Pennsylvania not-for-profit corporation with its principal place of business at 100 Barr Harbor Drive, West Conshohocken, Pennsylvania. ASTM maintains an office in Washington, DC, located at 1850 M Street, NW, Washington DC 20036. ASTM’s Washington office staff includes ASTM’s Vice President of Global Policy and Industry Affairs and ASTM’s Manager of Government and Industry Affairs. The DC staff focuses on communicating with the federal government and industry to increase awareness about ASTM’s standards and to encourage participation in ASTM’s standard development activities.

5. Plaintiff National Fire Protection Association, Inc. (“NFPA”) is a Massachusetts not-for-profit corporation with its principal place of business located at One Batterymarch Park, Quincy, MA 02169. NFPA maintains an office in Washington, DC, located at 1401 K Street, NW, Suite 500, Washington, DC 20005. NFPA’s Washington office staff includes its Director of Government Affairs. The staff’s primary responsibilities include monitoring federal activities

and facilitating outreach to the federal government concerning NFPA standards as well as other fire, electrical, building, and life safety issues related to NFPA's safety mission.

6. Plaintiff American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ("ASHRAE") is a New York not-for-profit corporation with its principal place of business located at 1791 Tullie Circle, N.E., Atlanta, GA 30329. ASHRAE maintains an office in Washington, DC, located at 1828 L St., NW, Washington, DC 20036, which was established approximately 33 years ago. ASHRAE's Washington office staff includes ASHRAE's Director of Government Affairs, a Senior Manager of Federal Government Affairs, a Manager of State and Local Government Affairs, and an office manager. That DC staff is engaged in building relationships for ASHRAE with numerous government representatives, including members of Congress and their staffs, and with many international organization representatives. They also facilitate the dissemination of technical information and assistance on matters affecting the public, the engineering profession and the ASHRAE professional community; they collect, digest and disseminate to ASHRAE members and staff relevant information regarding current or anticipated government actions; and they pursue technology transfer and government funding opportunities independently or jointly with other organizations.

7. Defendant Public Resource is a California corporation with its principal place of business at 1005 Gravenstein Highway North, Sebastopol, CA 95472.

#### **NATURE OF ACTION, JURISDICTION, AND VENUE**

8. This is an action for infringement and contributory infringement of federally registered copyrights in violation of 17 U.S.C. § 501, infringement of trademarks in violation of Sections 32 and 43 of the Lanham Act, 15 U.S.C. §§ 1114 and 1125, and common law trademark infringement.

9. This Court has jurisdiction over this action pursuant to 15 U.S.C. § 1121 and pursuant to 28 U.S.C. §§ 1331, 1338(a) and 1400, because this is a civil action arising under an Act of Congress relating to copyrights and trademarks. This court has supplemental jurisdiction over the common law trademark infringement claim asserted herein pursuant to 28 U.S.C. § 1367 because this claim is so related to the federal claims that they form part of the same case or controversy and derive from a common nucleus of operative facts.

10. Venue is proper in this court pursuant to 28 U.S.C. §§ 1391 and 1400: because the claims alleged in the Complaint arose, in substantial part, in the District of Columbia; because the Defendant may be found in this District; and because this Court has personal jurisdiction over Defendant. Among other things, Defendant has directed its infringing activities to this District and, on information and belief, has materially contributed to the infringing activities of third parties in this District. Defendant has designed its website to attract visitors from the District of Columbia who are encouraged to copy, to distribute to others in this District and/or to create derivative works based on Plaintiffs' standards incorporated by reference into the law of the District of Columbia. Visitors also are solicited to submit financial donations on Defendant's website through the Defendant's PayPal account. Moreover, Defendant sells various items on the Internet, including Public.Resource.Org stamps and stickers, amongst other items. *See* <http://www.zazzle.com/carlmalamud/>.

11. Defendant also has participated in conferences, round tables, and meetings in the District of Columbia. *See, e.g.,* [http://news.cnet.com/8301-13512\\_3-10354324-23.html](http://news.cnet.com/8301-13512_3-10354324-23.html); <http://web.resourceshelf.com/go/resourceblog/58874>; and <http://www.gov2expo.com/gov2expo2010/public/schedule/speaker/1824>. Defendant also recently posted copyrighted material owned by a third party online and engaged in public

relations activities connected thereto that were directed toward the District of Columbia. *See* <http://frrole.com/o/this-is-really-good-to-hear-washington--carlmalamud-washington-dc>; <http://www.washingtontimes.com/news/2013/mar/31/ignorance-of-dcs-copyrighted-laws-can-be-costly/>; and <http://frrole.com/o/this-is-really-good-to-hear-washington--carlmalamud-washington-dc>.

## **FACTS**

### **I. THE UNITED STATES STANDARDS DEVELOPMENT SYSTEM**

12. The term “standards” comprises a wide variety of technical works ranging from codes to compilations of rules, test methods, interoperability standards, product specifications, installation standards, guidelines, and recommended practices. Standards can range in length from a few pages, such as ASTM E2877-12e1: Standard Guide for Digital Contact Thermometers, promulgated by ASTM International, to hundreds of pages, such as NFPA 70, *National Electrical Code* (“*National Electrical Code*” or “NEC”), promulgated by the NFPA.

13. Standards sometimes may be developed by government entities. Indeed, in most other countries, standards are typically developed or overseen by the government, and are paid for or heavily subsidized by government funds.

14. In the United States, however, standards are typically developed by private organizations with technical expertise in the relevant area. In fact, the National Technology Transfer and Advancement Act of 1995 requires federal agencies to use privately developed standards wherever possible. § 12, Pub. L. No. 104-113, 110 Stat. 775, 782-83 (1996) (codified as part of 15 U.S.C. § 272 (2006)). Privately developed standards are used by the private sector for voluntary self-regulation and as a source of best practices. Some privately developed

standards also are incorporated by reference by government entities in statutes, regulations, and ordinances.

15. The United States standards development system has evolved over more than a century as a decentralized system of private organizations. These organizations develop standards in different ways, and for myriad purposes. Although this system of private organizations receives virtually no government funding, it yields substantial public benefits. It provides the public sector with up-to-date, technically advanced, widely accepted standards—which may be used and adopted by reference, at no cost, by government entities at the local, state, and federal level—subject to the standards organizations retaining the copyright in the standards.

**A. The Evolution of the United States Standards Development System**

16. Private-sector standards confer tremendous benefits on society. The need for voluntary, uniform standards to deal with an increasingly technical society emerged during the Industrial Revolution. As technology advanced at a breathtaking pace, and American industry grew exponentially, the absence of widely accepted standards created grave threats to public health and safety.

17. For example, at the turn of the twentieth century, the size of the threads on fire hydrants and hoses varied across the major cities of the Atlantic seaboard. When a large fire burned out of control in Baltimore in 1904, fire brigades from Washington, D.C., New York, Philadelphia, and elsewhere arrived to lend assistance. But because the threads on their hoses did not match the Baltimore fire hydrants, they stood by helplessly as the conflagration consumed 70 blocks of downtown Baltimore.

18. Similarly, a fire at the crowded Triangle Shirtwaist Company in New York City cost 146 garment workers their lives in 1911. Locked exit doors, the lack of a fire alarm, unreliable fire escapes, and the absence of proper methods for extinguishing the fire all contributed to the devastation.

19. As another example, there were no fewer than 20 different gauges of track in the early days of the railroad industry, making it difficult and costly to connect railroads and travel over long distances.

20. In response to these types of problems, private organizations were founded to develop standards that would apply nationwide within a particular industry or field. For example, ASTM Standard A1 provided uniform specifications for carbon steel tee rails that made it possible for manufacturers from different parts of the country to cooperate in building the national railroads.

21. Over time, the number of organizations dedicated to the development of standards—and the breadth of their activities—expanded along with the evolution of existing technologies and the emergence of new ones. Today, there are more than 600 organizations within the United States that develop voluntary standards. These organizations have promulgated approximately 93,000 active standards.

22. There are many different types of private-sector standards, including standards governing materials testing, systems design and installation, product testing and certification, and professional qualifications. Private-sector standards are developed on a wide array of subjects, such as indoor air quality, building and electrical safety, welding procedures, and the design of manufacturing equipment.

23. Standards preserve public safety, protect consumers, ensure compatibility and uniformity across products and services, facilitate training and education, and spur innovation. Standards usually are highly technical and specialized, and are written for audiences that have particular expertise in the relevant fields.

#### **B. The Standards Development Process**

24. Private-sector standards are developed in a variety of ways. Some are developed by ad hoc business groups or consortia that convene to create standards for a specific business purpose and do not provide for public review or broad participation. The most widely used and accepted standards, however, are what are known as “voluntary consensus standards.” Voluntary consensus standards are developed through published procedures that ensure broad participation of the affected interests, provide for public comment, and ensure due process through a mechanism for appeal.

25. Not-for-profit organizations usually develop voluntary consensus standards. Some of these organizations are trade associations that fund their standards activities through membership or participation fees. Others, particularly those that develop standards related to health, safety and the environment, sustain their standards development activities, in significant part, with revenues derived from the sales or licensing of their copyright-protected standards to the people and companies who use those standards in the course of their professional work.

26. There are several different types of U.S.-based standards developing organizations that develop voluntary consensus standards (hereafter, “SDOs”). They include trade associations, professional societies, third-party organizations that test and certify products, and general membership organizations created to pursue public interest goals. Some SDOs produce a single standard, while others produce hundreds. For some SDOs, standards

development is an ancillary activity; for others, it is their main activity and the principal means by which they serve their missions.

27. While SDOs function independently, many cooperate through the American National Standards Institute (“ANSI”). ANSI is a not-for-profit organization that coordinates voluntary consensus standards development in the United States. ANSI is a federation that draws its members from SDOs and other professional, technical, trade, labor, academic, industry, and consumer organizations, as well as government agencies. Among its principal functions, ANSI accredits SDOs whose procedures meet ANSI requirements governing openness, consensus and due process.

28. All Plaintiffs in this case are ANSI-accredited SDOs that also are not-for-profit organizations, organized under their respective state laws, and recognized as tax exempt for federal purposes under Section 501(c)(3) of the Internal Revenue Code.

29. Drafting effective standards requires wide-ranging creative input from a variety of concerned constituencies and sources of expertise. Plaintiffs rely on committees to create and revise their standards. As required by ANSI, these committees contain balanced membership, including experts within the particular field addressed by the standard, consumers, government representatives, industry representatives, and other interested stakeholders.

30. Plaintiffs also comply with the other ANSI essential requirements governing the process for developing voluntary consensus standards. Those requirements include: open proceedings; proceedings that are not dominated by any single interest; coordination and harmonization with existing standards; public notice of standards of activity; consideration of views and objections; consensus voting methods; opportunity for appeals; and written

procedures. The federal government has recognized that these procedural protections are the hallmarks of a “voluntary consensus standards body.”

31. Plaintiffs regularly publish standards that they create through such processes, in both print and electronic form. Plaintiffs’ standards reflect the complex expression of a multitude of ideas, and contain original and highly creative content.

32. Because technology and best practices continue to evolve, Plaintiffs’ work is ongoing. Plaintiffs publish revised versions of their standards on a regular basis, as required by ANSI, as well as ever-changing technology and marketplace demands. New versions may add content that responds to changes in the industry, or may expand and improve the standards to make them more effective.

### **C. The Benefits of Plaintiffs’ Standards**

33. Plaintiffs’ standards confer significant public benefits. Plaintiffs’ standards promote public health and safety, in fields as diverse as consumer products, indoor air quality, building and electrical safety, welding procedures, construction materials, alarm systems, fire test methods, and the design of manufacturing equipment. By identifying and embracing best practices, Plaintiffs’ standards help protect the public from dangerous practices and products. In addition to protecting the public, Plaintiffs’ standards benefit consumers by helping to ensure the quality and consistency of goods and services. For example, ASTM F977 Consumer Safety Specification for Infant Walkers addresses the quality and safety of a category of products used by young children.

34. Plaintiffs’ standards also help drive technological innovation. A recent report by the National Science and Technology Council concluded that

[s]tandards can play an important role in enabling technological innovation by defining and establishing common foundations upon which product differentiation, innovative

technology development and other value-added services may be developed. Standards are also essential for enabling seamless interoperability between and across products and systems. In the United States private-sector-led standards development that is informed by market needs has played a foundational role in facilitating competition, innovation and global trade.

See Federal Engagement in Standards Activities to Address National Priorities 3 (Oct. 2011), available at [http://www.whitehouse.gov/sites/default/files/microsites/ostp/federal\\_engagement\\_in\\_standards\\_activities\\_october12-final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/federal_engagement_in_standards_activities_october12-final.pdf).

35. Plaintiffs' standards also make markets more efficient. Without building-related standards, such as model building codes, Plaintiff NFPA's *Life Safety Code*, or Plaintiff ASHRAE's *Ventilation for Acceptable Indoor Air Quality* standard, contractors, trades people and manufacturers of building materials would be confronted with an extraordinarily complex marketplace, where the practices governing their businesses vary widely from one town to the next. Building standards provide for consistency across jurisdictions, enabling the efficient exchange of building materials and services. Similarly, standards allow for the interoperability of products. For example, the nationwide use of Plaintiff NFPA's *National Electrical Code*, in conjunction with other product standards, helps to ensure that wherever consumers go in the United States, their electric appliances can be plugged in and will operate safely and effectively.

36. Many of Plaintiffs' standards apply to and are referenced by professionals and specialists—including manufacturers, installers, trades people, engineers, architects, and technical experts—rather than members of the general public. Hence, while Plaintiffs' standards ultimately benefit members of the public, the vast majority of their standards are directed to manufacturers, professionals, and other specialists and are highly technical in nature.

#### **D. Government Incorporation of Private-Sector Standards**

37. In addition to their many private uses, a portion of these voluntary consensus standards also have been incorporated by reference into the laws of government entities, at little to no cost to taxpayers (beyond the minimal travel costs attendant to the participation of government representatives on SDO consensus bodies). For well over a hundred years, government entities have used privately developed standards to provide health, safety, and other technical regulations for the benefit of the public, simply by incorporating the standards by reference into statutes, regulations, and ordinances. When governments incorporate by reference the standards of Plaintiffs and other SDOs, it amplifies the public benefits of these standards, yielding tremendous efficiency gains and substantial savings for taxpayers.

38. In the early part of the twentieth century, many state and local governments adopted model codes on such common subjects as construction, fire safety, and electrical work. For example, NFPA's *National Electrical Code* was first published in 1897. By the 1930s, approximately 2,000 communities throughout the United States adopted the NEC, and many cities and states that previously followed unique electrical codes had revised them to conform to the national model.

39. Federal policy strongly encourages the development of standards by private organizations and the incorporation of those standards by federal departments and agencies. In 1982, the federal Office of Management and Budget promulgated OMB Circular No. A-119 ("the OMB Circular"). In its current iteration, the OMB Circular "directs agencies to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical." The policy articulated in the OMB Circular is "intended to

reduce to a minimum the reliance by agencies on government-unique standards,” in order “to achieve the following goals:”

- a. Eliminate the cost to the Government of developing its own standards and decrease the cost of goods procured and the burden of complying on agency regulation.
- b. Provide incentives and opportunities to establish standards that serve national needs.
- c. Encourage long-term growth for U.S. enterprises and promote efficiency and economic competition through harmonization of standards.
- d. Further the policy of reliance upon the private sector to supply Government needs for goods and services.

The OMB Circular is available at

[https://www.google.com/#bav=on.2,or.r\\_qf.&fp=335c82eb2f3786ba&q=omb+circular+no+a+11](https://www.google.com/#bav=on.2,or.r_qf.&fp=335c82eb2f3786ba&q=omb+circular+no+a+11)

9.

40. In 1995, Congress enacted the National Technology Transfer and Advancement Act (the “NTTAA”). The NTTAA codifies the federal government’s policy of adopting privately developed standards. With certain exceptions, the NTTAA provides that “all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments.” The NTTAA is available at <http://www.gpo.gov/fdsys/pkg/PLAW-104publ113/pdf/PLAW-104publ113.pdf>.

41. Today, literally thousands of private-sector standards are incorporated by reference in the Code of Federal Regulations. Thousands of standards are also adopted by state and local governments. Hundreds of Plaintiffs’ standards have been incorporated by reference by various government entities.

42. Governments at all levels adopt standards developed by SDOs because they yield substantial benefits and efficiencies. Incorporating existing standards by reference allows

government agencies to develop a comprehensive regulatory scheme quickly and with limited costs. By comparison, government agencies and bodies at all levels would incur enormous expenses if they were to engage in the lengthy and complicated process of developing their own unique standards. The cost of coordinating, updating, testing and the many other activities required to keep standards up to date and to comply with the demanding and rigorous procedural requirements that Plaintiffs and other SDOs follow would be enormous, and in many cases cost-prohibitive, for government agencies and bodies at many levels.

43. Moreover, because standards created by SDOs reflect the collective experience, knowledge, and judgment of industry representatives, practitioners, academics, and other experts, incorporation by reference enables the government to capitalize on expertise from the private sector that often does not exist within government bureaucracy—particularly with respect to ever-evolving industries and technologies. As the National Science and Technology Council noted in its recent report, the “U.S. government has long recognized that the private-sector, driven by innovators and market need, is ordinarily in the best position to drive standardization in a technology area.” Federal Engagement in Standards Activities to Address National Priorities 3 (Oct. 2011), available at [http://www.whitehouse.gov/sites/default/files/microsites/ostp/federal\\_engagement\\_in\\_standards\\_activities\\_october12-final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/federal_engagement_in_standards_activities_october12-final.pdf). For this reason, the Administrative Conference of the United States concluded that incorporation by reference “furthers important, substantive regulatory policies, enabling agencies to draw on the expertise and resources of private-sector standard developers to serve the public interest.” Administrative Conference of the United States, Recommendation 2011-5, at 1, available at

<http://www.acus.gov/sites/default/files/Recommendation-2011-5-Incorporation-by-Reference.pdf>.

44. For example, the Federal Energy Regulatory Commission (“FERC”) has incorporated by reference standards created by the North American Energy Standards Board (“NAESB”), because of its view that the NAESB “process is [a] far more efficient and cost effective method of developing technical standards for the industries involved than the use of a notice and comment rulemaking process involving numerous technical conferences in Washington that all believe they have to attend.” Standards for Business Practices and Communication Protocols for Public Utilities, 74 Fed. Reg. 63,288, 63,302 (Dec. 3, 2009).

45. Incorporating existing standards also decreases the burden of regulation on industry. Plaintiffs’ standards align with existing industry best practices, with which many regulated parties already comply. Incorporation by reference, therefore, reduces gaps between government regulation and industry practice, and makes it easier and less expensive for industry to comply with regulations.

#### **E. Costs of Developing Private-Sector Standards**

46. The development of high quality, up-to date, voluntary consensus standards is costly. In addition to the value of the time and expertise contributed by the many volunteers who participate in the standards-development process, Plaintiffs expend substantial resources to provide the administrative, technical, and other support necessary to produce standards. Plaintiffs must pay for salary and benefits for administrative and expert staff, office space, meeting facilities, outreach and education efforts, information technology, and the cost of publication of their standards, among other things.

47. The robust and open process followed by Plaintiffs, which includes multiple levels of review, opportunity for notice and comment, and representation from a diverse array of interests, is particularly costly to administer and coordinate. For example, NFPA has spent significant sums to build a computerized interface that allows for the online development and revision of standards. It also has increased the participation of underrepresented groups on its technical committees, such as by creating an Enforcer Funding Program to raise the percentage of government enforcement officials on the committees, during a time of public-sector budget cuts.

## **II. PLAINTIFFS' STANDARDS**

### **A. Plaintiff ASTM's Standards**

48. For more than 100 years, ASTM has provided a global forum for the development and publication of voluntary consensus standards for materials, products, systems, and services that are utilized by ninety industry sectors in the United States and in most geographic regions of the world. ASTM is the developer and publisher of over 12,000 voluntary consensus standards in a wide range of fields, including, but not limited to, consumer products, iron and steel products, rubber, paints, plastics, textiles, medical services and devices, electronics, construction, aviation, energy, water, and petroleum products.

49. Over 30,000 individuals representing 135 countries, including manufacturers, retailers, consumers, representatives from government agencies, academics, and researchers, serve on ASTM's 143 Technical Committees. Each Technical Committee is further divided into more focused technical areas called subcommittees.

50. The voting membership of each ASTM Technical Committee is constituted to include a balance of relevant interests. For example, producers or sellers of materials, products,

systems or services covered within the scope of a given committee or subcommittee cannot exceed more than 50 percent of the voting membership of that committee or subcommittee. All standards actions, including new standards as well as revisions, withdrawals and reapprovals of existing standards, must be approved by at least 66.7 percent of the voting subcommittee members and 90% of the voting main committee members, with not less than 60 percent of the voting members returning ballots.

51. ASTM standards development activities are governed by a detailed set of written procedures that are accredited by ANSI as satisfying the essential requirements of a voluntary consensus standards development process. The process through which ASTM develops its standards includes multiple levels of review, and numerous opportunities for public review and comment. All ASTM standards are reviewed on a 5 year schedule and reapproved, revised or withdrawn in revision cycles that typically take 8-12 months to complete. Each revision cycle proceeds according to a published schedule that includes final dates for all major events in the process, including opportunities for input and comment, Technical Committee meetings, appeals, and final publication of the standard.

52. ASTM strives to enable broad stakeholder representation in the process and does everything possible to minimize barriers to entry. Individual participating ASTM members pay \$75 annually for membership, which entitles them to full participation rights in the development of standards and free access to standards relevant to their interest. ASTM often waives the membership fee for interested consumers or participants from developing countries.

53. Each year ASTM incurs substantial costs for its standards development infrastructure and delivery platforms, including resources for collaboration, Technical Committee meetings, balloting, editorial, production, distribution, promotion and protection of

ASTM Standards. ASTM also incurs significant costs related to achieving and maintaining accreditation by ANSI and for engaging in policy-related activities within the global standards community.

54. Sales of ASTM's standards account for approximately 75% of ASTM's total revenue.

55. Many ASTM standards have been incorporated by reference by government entities in statutes, regulations, and ordinances.

56. For example, the U.S. Department of Agriculture (USDA) BioPreferred Program, which is designed to increase the promotion and use of biobased products, incorporates by reference ASTM D6866 -- Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis -- to calculate the biobased content included in a given material. Over 9,000 products from nearly 90 product categories have qualified for this USDA program. According to USDA, the increased purchase of biobased products will be expected to reduce petroleum consumption, increase the use of renewable resources, better manage the carbon cycle, and may contribute to reducing adverse environmental and health impacts.

57. Over 1,200 ASTM standards, out of more than 12,000 total ASTM standards, are referenced in the Code of Federal Regulations. ASTM has not voluntarily transferred or licensed any of its rights in these standards to any governmental agencies whose regulations incorporate ASTM's standards. Nor has ASTM been compensated by the federal government for any of its safety standards.

58. ASTM owns or controls the copyrights and/or the relevant exclusive rights in the works at issue in this case ("ASTM Standards") under the United States copyright laws. ASTM

has obtained Certificates of Copyright Registration from the Register of Copyrights for the ASTM Standards. Attached hereto as Exhibit A is a list of the ASTM Standards that Defendant infringed by the acts complained of herein. Exhibit A also identifies by number the Certificates of Copyright Registration issued to ASTM.

59. The ASTM standards are original works of authorship. The content of the ASTM Standards is original to ASTM and includes a high degree of creativity.

60. ASTM expressed the concepts underlying its standards through particular words and drawings that it selected from myriad options through which it could have expressed those concepts.

61. ASTM owns the exclusive trademark rights in the following registered trademarks that refer to ASTM (the “ASTM Marks”):

- a. U.S. Trademark Registration No. 2,679,320, which covers the ASTM word mark.
- b. U.S. Trademark Registration No. 2,685,857, which covers the ASTM INTERNATIONAL word mark.
- c. U.S. Trademark Registration No. 2,651,796, which covers the following logo:



- d. U.S. Trademark Registration No. 4,079,772, which covers the following logo:



62. ASTM also owns common law rights in the ASTM Marks.

63. Through ASTM's exclusive, continuous and widespread use of the ASTM Marks, the ASTM Marks have acquired a substantial amount of goodwill, and consumers have come to rely on the ASTM Marks to identify ASTM's high quality goods and services. ASTM has spent significant funds and resources marketing and promoting its goods and services in connection with the ASTM Marks, and considers them to be important, valuable assets. ASTM vigorously and continuously enforces its ASTM Marks against infringers and counterfeiters.

**B. Plaintiff NFPA's Standards**

64. Founded in 1896, the NFPA is a not-for-profit organization incorporated as a public charity under the laws of the Commonwealth of Massachusetts and recognized as a Section 501(c)(3) organization under the Internal Revenue Code. The NFPA's mission is to reduce the dangers of fire and other hazards by providing and advocating for consensus standards, research, training, and education. The development of voluntary consensus standards is NFPA's principal activity and the primary means through which it furthers its safety mission.

65. NFPA develops and disseminates over 300 standards in the areas of fire, electrical, and building safety. These standards are designed to minimize damage to property

and to protect people from death and injury. NFPA standards range from large, multi-chapter installation standards such the *National Electrical Code*, to standard test methods of only a few pages, such as NFPA 259, *Standard Test Method for Potential Heat of Building Materials*. There are many different types of NFPA standards, covering a broad range of subjects. By way of example, NFPA has promulgated standards regarding fire protective clothing, fire service professional qualifications, firefighting equipment, firefighter training, incident management, and firefighter deployment. NFPA standards also cover the installation of electrical systems, fuel gas piping, and other building systems and components, and offer guidance on emergency and disaster planning, explosion prevention, and fire investigation. There are NFPA standards that apply to homes and hospitals, airports and coal mines, tunnels and historic structures, grain silos and nuclear power plants.

66. NFPA's flagship work is the *National Electrical Code*, which is the world's most widely used and accepted standard for electrical installations. The NEC was created in 1897 out of a desire to establish uniform standards regarding the installation of electrical systems. Since 1959, the NEC has been revised every three years. Other widely used NFPA standards include the NFPA 13, *Standard for the Installation of Sprinkler Systems*, which establishes standards for the installation of fire sprinklers, and NFPA 101, *Life Safety Code*, which establishes standards for the protection of human life from fire, smoke, and toxic fumes in buildings and other structures.

67. NFPA's standards contain a variety of materials, including prescriptive rules, as well as explanatory material, such as informational notes and annexes, illustrations, charts, and diagrams.

68. NFPA standards are advisory and are made available for a wide variety of private and public uses. The private sector relies heavily on NFPA standards. Private actors use NFPA standards for purposes including industry and professional best practices, insurance underwriting, professional training and certification, worker protection, and product testing and certification.

69. NFPA standards are also widely incorporated by reference by government entities in statutes, regulations, and ordinances. Some NFPA standards, such as the NEC, are adopted by one or more levels of government in every state in the country. For example, the municipal regulations of the District of Columbia incorporate the NEC by reference. *See* 12 D.C. Mun. Regs. tit. 12, § 101.A(101.1). And virtually every NFPA standard is incorporated by reference by one or more of the thousands of local and state governments within the United States. The federal government also relies on NFPA standards; the Code of Federal Regulations references NFPA standards approximately 380 times.

70. NFPA standards development activities are governed by a detailed set of written procedures that are accredited by ANSI as satisfying the essential requirements of a voluntary consensus standards development process. The consensus bodies primarily responsible for the drafting and updating of NFPA standards are known as “Technical Committees” (or, in the case of the NEC, as “Panels”). Each Technical Committee is assigned a scope of activities that may include a number of standards or just one portion of a single standard.

71. NFPA’s Technical Committees are comprised of volunteers from business, industry, public interest groups, government, and academia, as well as other subject matter experts and stakeholders. An NFPA Technical Committee may include electricians, other tradesman, government officials, and experts with advanced degrees in electrical engineering or

many other fields. Although NFPA is a membership organization, individuals may serve on a Technical Committee without themselves being NFPA members.

72. Each NFPA Technical Committee is constituted to include a balance of relevant interests, with no one interest occupying more than one-third of the Committee. All new standard provisions, and any revision to an existing standard, must be approved by at least two-thirds of the Committee.

73. The NFPA process includes multiple levels of review, and numerous opportunities for public review and comment. All NFPA standards are revised and updated every three to five years, in revision cycles that typically take two years to complete. Each revision cycle proceeds according to a published schedule that includes final dates for all major events in the process, including opportunities for input and comment, technical committee meetings, appeals, and final issuance of the standard.

74. In addition to its standards development activities, NFPA works to protect lives and property through educational programs such as Fire Prevention Week in October—a national campaign for which NFPA has been the official sponsor since 1922—and by overseeing the operation of advocacy campaigns dedicated to increasing fire safety and awareness, including: the Fire Sprinkler Initiative, Bringing Safety Home, the Coalition for FireSafe Cigarettes, and the Alliance to Stop Consumer Fireworks. NFPA also publishes dozens of texts, guides, and other safety information and materials, and offers training on the content and use of its standards for professionals, government regulators, fire service members, and other first responders. And NFPA is the premier resource for fire data analysis and research (through its fire analysis department and the NFPA-affiliated Fire Protection Research Foundation). Many of NFPA's publications and activities are costly, but generate little or no revenue.

75. NFPA's day-to-day operations depend upon a reliable stream of revenue to cover the numerous expenses NFPA incurs in its activities. These expenses include, but are not limited to, employing a full-time staff of technical experts who serve as liaisons to committees in the standards development process, employing publication staff and administrative personnel, publishing standards, funding the NFPA-affiliated research foundation and educational outreach efforts, and arranging and paying for meeting sites. NFPA's revenues are approximately \$70 million on an annual basis and approximately 70% of NFPA's annual revenue is derived from the sale of its copyrighted publications, with the remaining revenue derived from membership fees, professional development, and other sources.

76. The standards created by NFPA are original works of authorship. The content of NFPA's standards is original to NFPA and includes a high degree of creativity.

77. The concepts underlying NFPA's standards are expressed through particular words and drawings that have been selected from myriad options through which these concepts could be expressed.

78. NFPA owns or controls the copyrights and/or the relevant exclusive rights in the works at issue in this case ("NFPA Standards") under the United States copyright laws. NFPA has obtained Certificates of Copyright Registration from the Register of Copyrights for its works. Attached hereto as Exhibit B is a list of certain of NFPA copyrighted works that Defendant has infringed by the acts complained of herein. Exhibit B also identifies by number the Certificates of Copyright Registration issued to NFPA.

79. NFPA owns or controls the exclusive trademark rights in the registered marks that refer to the NFPA organization and NFPA standards (the "NFPA Marks"), including:

a. U.S. federal registration no. 2,834,633, which covers the following logo:



b. U.S. federal registration no. 1,148,903, which covers the following logo:



c. U.S. federal registration no. 1,094,460, which covers the NATIONAL ELECTRICAL CODE word mark.

d. U.S. federal registration no. 3,165,010, which covers the NATIONAL FIRE PROTECTION ASSOCIATION word mark.

e. U.S. federal registration no. 1,165,496, which covers the NEC word mark.

f. U.S. federal registration no. 3,354,321, which covers the NFPA 70 word mark.

g. U.S. federal registration no. 3,141,884, which covers the NFPA word mark.

h. U.S. federal registration no. 1,924,881, which covers the NATIONAL FIRE ALARM CODE word mark.

i. U.S. federal registration no. 1,951,710, which covers the NFPA 72 word mark.

j. U.S. federal registration no. 1,107,267 which covers the LIFE SAFETY CODE word mark.

80. NFPA also owns common law rights in the NFPA Marks.

81. NFPA's use of the NFPA Marks, in publications, marketing materials, conferences and events, on its website, and in other contexts, has been substantially continuous and exclusive. NFPA has attained strong name recognition in the NFPA Marks, which have come to be associated with NFPA and which identify NFPA as the source of the NFPA's products offered in connection with the NFPA Marks. NFPA has developed substantial goodwill in the NFPA Marks. NFPA has spent significant sums marketing and promoting its products in connection with the NFPA Marks, and considers them to be important, valuable assets. NFPA has vigorously and continuously enforced its NFPA Marks against infringers and counterfeiters.

**C. Plaintiff ASHRAE's Standards**

82. Founded in 1894, ASHRAE is a not-for-profit organization incorporated as a public charity under the laws of the State of New York. ASHRAE's mission is to advance the arts and sciences associated with heating, ventilating, air-conditioning and refrigerating to serve humanity and promote a sustainable world. It does so through research, standards writing, publishing and continuing education. The development of voluntary consensus standards is ASHRAE's principal activity, and the primary means through which it furthers its safety mission.

83. ASHRAE develops and disseminates many standards in the areas of heating, ventilating, air-conditioning and refrigerating ("HVAC&R"). ASHRAE develops standards for both its members and others professionally concerned with HVAC&R processes and the design and maintenance of indoor environments.

84. ASHRAE writes standards for the purposes of establishing consensus for methods of HVAC&R-related testing for use in commerce, and establishing HVAC&R-related

performance criteria to facilitate guidance within the HVAC&R industry. ASHRAE publishes the following three types of voluntary consensus standards: Method of Measurement or Test, Standard Design and Standard Practice. ASHRAE does not write rating standards unless a suitable rating standard would not otherwise be available.

85. Consensus standards are developed and published to define minimum values or acceptable performance, whereas other documents, such as design guides, may be developed and published to encourage enhanced performance.

86. ASHRAE guidelines are developed through the participation of its national and international members, associated societies, and public review.

87. By way of example, Standard 90.1-2010, Energy Standard for New Buildings Except Low Rise Residential Buildings, was first promulgated in 1989. The 90.1 Standard was developed by a subcommittee whose mission was to balance the interest of all the members of the subcommittee as it relates to the insulation of all buildings, including metal buildings. The membership of the 90.1 subcommittee includes various manufacturers, architects, builders, and members of federal and state agencies.

88. In connection with the development and maintenance of the 90.1 Standard, ASHRAE provides for an ongoing review and revision of its Energy Standard through its Continuing Maintenance Procedures. These procedures include a Public Review Process and an Emergency Interim Standards Action. Although in practice ASHRAE issues revisions more frequently, ASHRAE typically publishes regular revisions to the 90.1 standard every 18 months.

89. In addition to its standards development activities, ASHRAE offers courses in a variety of formats, including eLearning, professional development seminars (in locations around North America or online), short courses (seminars offered during ASHRAE meetings) and self-

directed learning courses (home study courses), all through the ASHRAE Learning Institute. ASHRAE also produces hundreds of publications, including the ASHRAE Handbook (the “bible” of the HVAC&R industry), books on specialized topics within the field, technology applications and various CDs and DVDs. ASHRAE also publishes the peer-reviewed bimonthly HVAC&R Research—which is among the most prestigious archival research reporting resources in the field of environmental control for the HVAC&R industry. Further, ASHRAE’s research program, established in 1912, currently supports more than 70 active research projects with a combined value of more than \$12 million. Research focus includes: energy and resource efficiency, indoor environmental quality, alternative technologies, and materials and equipment. Through scholarships, grants and awards, ASHRAE supports engineering education for undergraduate students and research projects for graduate engineering students and new post-doctoral scholars.

90. ASHRAE’s day-to-day operations depend upon a reliable stream of revenue to cover the numerous expenses ASHRAE incurs in its activities, which amount to approximately \$21 million annually. Approximately 20-25% of ASHRAE’s annual revenue is derived from the sale of its copyrighted publications, with the remaining revenue derived from membership fees, advertising income, and other sources.

91. The standards created by ASHRAE are original works of authorship. The content of ASHRAE’s standards is original to ASHRAE and includes a high degree of creativity.

92. ASHRAE expressed the concepts underlying ASHRAE’s standards through particular words and drawings that it selected from myriad options through which it could have expressed those concepts.

93. ASHRAE owns or controls the copyrights and/or the relevant exclusive rights in the works at issue in this case under the United States copyright laws (the “ASHRAE Standards”). ASHRAE has obtained Certificates of Copyright Registration from the Register of Copyrights for the ASHRAE Standards. Attached hereto as Exhibit C is a list of ASHRAE Standards that Defendant has infringed by the acts complained of herein; the same Exhibit identifies by number the Certificates of Copyright Registration issued to ASHRAE for those works.

94. ASHRAE owns or controls the exclusive trademark rights in the following registered marks that refer to the ASHRAE organization and ASHRAE Standards (the “ASHRAE Marks”):

(a) U.S. federal registration no. 1,503,000 covering the following logo:



(b) U.S. federal registration no. 4,262,297 covering the following logo:



95. ASHRAE also owns common law rights in the ASHRAE Marks.

96. ASHRAE’s use of the ASHRAE Marks in publications, marketing materials, conferences and events, on its website, and in other contexts, has been substantially continuous

and exclusive. ASHRAE has attained strong name recognition in the ASHRAE Marks, which have come to be associated with ASHRAE and which identify ASHRAE as the source of the ASHRAE's products offered in connection with the ASHRAE Marks.

97. ASHRAE has developed substantial goodwill in the ASHRAE Marks. ASHRAE has spent significant sums marketing and promoting its products in connection with the ASHRAE Marks, and considers them to be important, valuable assets. ASHRAE has vigorously and continuously enforced its ASHRAE Marks against infringers and counterfeiters.

### **III. AVAILABILITY OF PLAINTIFFS' STANDARDS**

98. Plaintiffs make their standards available through multiple distribution channels, including Internet, catalog, telephone, and retail sales. Plaintiffs' standards are generally offered in a number of different formats, including a variety of electronic formats, individual pamphlets, complete bound sets, and loose-leaf subscription services.

99. ASTM strives to be flexible and reasonable when working with federal agencies and the regulated public to provide the public with reasonable access to its standards. ASTM charges a modest fee to persons who want copies of the ASTM standards. The most expensive ASTM standard costs \$71 and most ASTM standards cost between \$25 and \$35.

100. NFPA sells its standards at a reasonable cost to the professionals and tradespeople who use the standards. For example, the hard copy edition of the NEC, an 800-page work, is offered for purchase for \$75. NFPA publishes its standards in a variety of hard copy and digital formats. Those wishing to own a personal copy can purchase and download an electronic copy instantly, for example, or can purchase a subscription service that updates all NFPA standards and allows downloading, printing, and other functionalities.

101. ASHRAE Standards and Guidelines are available for purchase to everyone as downloadable Digital Publications (PDFs), hard copy, or CD-ROMs. For example, a hard copy of the complete ASHRAE Standard 90.1-2010 – Energy Standard for Buildings Except Low-Rise Residential Buildings – is typically sold for \$125. The ASHRAE online bookstore is updated each time a new publication from ASHRAE is available.

102. It is also common for SDOs to provide access to their standards (or portions thereof) for free. The specific details surrounding access to standards vary depending on the SDO at issue, the nature of the standard, and the audience that consumes it.

103. ASTM has created a reading room on its website, available at <http://www.astm.org/READINGLIBRARY/index.html>, through which the public can access all ASTM standards that have been incorporated by reference into federal regulations at no cost on a read-only basis. That is, members of the public may access the standards online and view them at no cost, but are not able to copy or modify them. Additionally, when a federal agency proposes to incorporate by reference an ASTM standard in rulemaking, ASTM works with the relevant agency to provide the public with read-only access to the standard at no cost during the public comment period.

104. As part of its commitment to enhancing public safety, NFPA began making the full text of NFPA standards available for free viewing on its website, in read-only form, more than a decade ago. NFPA currently provides such access for all of its standards, including many older editions that are still referenced in laws. *See* [http://www.nfpa.org/aboutthecodes/list\\_of\\_codes\\_and\\_standards.asp](http://www.nfpa.org/aboutthecodes/list_of_codes_and_standards.asp). This access allows any member of the public, including citizens of jurisdictions that have incorporated NFPA standards by reference, to review NFPA standards without cost. NFPA also encourages jurisdictions that

incorporate its standards by reference to link their websites to its free, online version of the standards.

105. ASHRAE strongly supports public access to its standards. It currently provides free-to-the-public online read-only access, in non-downloadable format, to 28 standards, including every single standard referenced in laws or codes. This includes all the ASHRAE Standards listed on Exhibit C. This access is provided through a service called RealRead®. ASHRAE incurs significant costs in order to provide such access.

106. Government entities have adopted policies for providing public access to the standards they incorporate by reference. For example, the Code of Federal Regulations states that any materials incorporated by reference at the federal level must be “reasonably available to and usable by the class of persons affected by the publication.” 1 C.F.R. § 51.7(a)(4). In particular, the Office of the Federal Register and the relevant agency each must maintain a hard copy of any material incorporated by reference that is available for public inspection. *See* 1 C.F.R. §§ 5.2, 51.9(b)(4). At the state and local levels, copies of standards incorporated by reference typically must be made available for inspection in government offices or designated depository libraries.

107. The Code of Federal Regulations does not provide a precise definition of the term “reasonably available.” Neither the Office of the Federal Register nor any other governmental body has ever interpreted “reasonably available” to mean that the material must be available to the public without cost (let alone for free with the further ability to copy, distribute and modify).

108. Government entities have expressly recognized the considerable benefits of the developer of standards retaining copyright protection for standards that are incorporated by reference. For example, the National Science and Technology Council has taken the position

that “the text of standards and associated documents should be available to all interested parties on a reasonable basis, *which may include monetary compensation where appropriate.*” Federal Engagement in Standards Activities to Address National Priorities 11 (Oct. 2011), available at [http://www.whitehouse.gov/sites/default/files/microsites/ostp/federal\\_engagement\\_in\\_standards\\_activities\\_october12-final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/federal_engagement_in_standards_activities_october12-final.pdf) (emphasis added).

109. OMB Circular 119-A also takes the position that incorporation by reference of a standard does not destroy the copyright in that standard. It states that “[i]f a voluntary standard is used and published in an agency document, your agency must observe and protect the rights of the copyright holder and any other similar obligations.” *See* [http://www.whitehouse.gov/omb/circulars\\_a119](http://www.whitehouse.gov/omb/circulars_a119).

110. A number of offices within the Executive branch are currently engaged in the process of evaluating the procedures for incorporating material by reference, in a manner that allows for reasonable access by the public and also respects the rights of copyright owners to protect their intellectual property.

111. Although Public Resource participated in this process by submitting extensive comments and letters to these offices, both before and during this process it engaged in conduct that infringed on Plaintiffs’ copyrights. In or around March 2012, for example, Public Resource launched a campaign designed to make an end-run around the Executive branch evaluation process by flagrantly copying and distributing certain standards that had been incorporated by reference into federal or state regulations.

#### **IV. DEFENDANT'S UNLAWFUL CONDUCT**

##### **A. Copyright Infringement**

112. Public Resource has purchased paper copies of 73 standards created and owned by SDOs, including standards created and owned by ASTM and NFPA, that have been incorporated by reference in federal regulations.

113. Upon information and belief, although well aware that the SDOs owned copyrights in the standards, Public Resource made 25 print copies of each of these standards, placed them in boxes covered with American flag packing tape, and sent the packages to a number of recipients, including the 10 SDOs that wrote the standards, the White House, United States Senators and Congressmen, the National Archives, the Federal Trade Commission, the Administrative Conference of the United States, the Copyright Office, several professors, and members of the media. Each package also included a packing slip informing the recipient of the cost Public Resource expended to obtain the standards and requesting some manner of action.

114. Public Resource's statements to the media made it clear that it intended to begin posting these 73 standards on the internet in HTML format. Attached as Exhibit D is an article by Public Resource's president discussing Public Resource's intentions.

115. In or about December 2012, without Plaintiffs' consent, Public Resource began posting copies of those 73 standards and other standards that were created and owned by Plaintiffs that are allegedly incorporated by reference in federal and state regulations ("Plaintiffs' Standards") on its website, which is located at <https://law.resource.org/pub/us/cfr/manifest.us.html>.

116. Public Resource also took steps to induce, promote, cause, and materially contribute to the further copying and dissemination of Plaintiffs' Standards by members of the

public. Public Resource posted Plaintiffs' Standards on its website in pdf format, which allows others not only to view but also to make further unauthorized copies of Plaintiffs' Standards and to distribute them to others. Upon information and belief, Public Resource also has uploaded standards owned by Plaintiffs without authorization to the [www.archive.org](http://www.archive.org) website. The electronic nature of these documents, and their availability on the Internet, magnifies the ease and speed with which they may be reproduced and disseminated to others.

117. Moreover, Public Resource "rekeyed" some of Plaintiffs' Standards and posted them on its website in html format. Its stated purpose for doing this was to make it possible for members of the public to copy and manipulate the standards, thereby encouraging the creation of works that are derivative of Plaintiffs' copyrighted standards. Public Resource also redrew graphics within some of Plaintiffs' Standards in the open Scalable Vector Graphics (SVG) format, which enables the images to be searched, indexed, scripted, and compressed. Further, Public Resource reset mathematical formulas into the Math Markup Language application that integrates mathematical formulae into web pages and other documents to make it easier for members of the public to manipulate the standards. And Public Resource added metadata to the document "headers," which made Plaintiffs' Standards more accessible and discoverable by Internet search engines, thereby increasing the number of people who might access the standards and disseminate them further. *See* Exhibit E, a printout from Public Resource's website.

118. Public Resource designed its website to attract visitors from states throughout the Nation, including by organizing Plaintiffs' Standards by jurisdiction so that visitors may download and copy the Standards adopted by their jurisdiction. For example, the Public Resource website has a page dedicated to "Public Safety Codes Incorporated By Law," with a separate section linking to copies of standards incorporated by reference by the District of

Columbia, including the *National Electrical Code*. Attached as Exhibit F hereto is a copy of the section of Public Resource's website that provides copies of standards incorporated by reference by each state and the District of Columbia.

119. According to Public Resource's website, standards have the force of law when they are incorporated by reference and:

[t]he law belongs to the people, and cannot become the private property of some governmental or non-governmental organization, no matter how seemingly well-deserved are the rents one could extract from winning a monopoly concession on a parcel of the law. While standards bodies need money to carry out their valuable work, and while it is clear that these standards bodies create high-quality documents that are essential to our public safety, one cannot cordon off the public domain simply because of an institutional desire for funds.

Thus, Public Resource's website states that Public Resources has copied and posted standards created and owned by many SDOs, including Plaintiffs' Standards, "as it is the right of all humans to know and speak the laws that govern them." *See* Exhibit E.

120. Public Resource has represented that all of the standards it has copied and displayed on its website have been incorporated by reference into federal and state law. However, some Standards that Public Resource claims were incorporated by reference into federal law have not in fact been incorporated into the Code of Federal Regulations.

121. Plaintiffs' Standards, which are original works of authorship that Plaintiffs developed at great cost and effort, unquestionably were afforded copyright protection the moment Plaintiffs fixed them in tangible forms of expression.

122. If Public Resource were to prevail in its argument that Plaintiffs' Standards lost their copyright protection whenever incorporated by reference in any federal or state regulation, this would raise serious questions of government liability under the Takings Clause of the Fifth

Amendment to the United States Constitution, made applicable to state and local governments through the Fourteenth Amendment.

**B. Trademark Infringement**

123. In copying and rekeying Plaintiffs' Standards, Public Resource has also used in commerce a reproduction or copy of Plaintiffs' registered trademarks in connection with the sale, offer for sale, distribution or advertising of goods or services.

124. Public Resource has used reproductions or copies of ASTM's Marks in connection with the distribution of ASTM's Standards. Attached as Exhibit G is an excerpt from an ASTM standard that Public Resource has posted on its website that contains a reproduction or copy of several of ASTM's Marks.

125. Public Resource has used reproductions or copies of NFPA's Marks in connection with the distribution of NFPA's Standards. For example, attached as Exhibit H is an excerpt from an NFPA standard that Public Resource has posted on its website that contains a reproduction or copy of several of NFPA's Marks.

126. Public Resource has used reproductions or copies of ASHRAE's Marks in connection with the distribution of ASHRAE's Standards. Attached as Exhibit I is an excerpt from an ASHRAE standard that Public Resource has posted on its website that contains a reproduction or copy of several of ASHRAE's Marks.

127. Plaintiffs have not authorized Public Resource to use their trademarks, and use of Plaintiffs' trademarks by Public Resource is likely to lead consumers to believe mistakenly that the standards displayed on Public Resource's website are authentic, unaltered standards of each respective Plaintiff that meet Plaintiffs' quality control standards, and/or that Plaintiffs have endorsed, approved, or are otherwise affiliated with Public Resource and/or its activities.

128. Public Resource has implied and/or suggested to the public that Plaintiffs sponsor or endorse Public Resource's posting of the standards by including a cover page before certain standards that states the name of the standards body that created the standard and contains an image of a seal of approval. The first page of Exhibit G provides an example of the cover page that Public Resource has added to certain of Plaintiffs' Standards.

129. Many of Plaintiffs' Standards that Public Resource has displayed and distributed on its website are not the current versions of the standards that have been published by the relevant Plaintiff. The copies that Public Resource has displayed and distributed on its website do not contain any notation that indicates that these standards are out-of-date. Absent a warning that a standard is not the most recent version, consumers are likely to be misled into believing that the versions of Plaintiffs' Standards that are displayed on its website constitute current industry standards and/or are currently endorsed by the organization that created the standard.

130. Public Resource has retyped the text of some of Plaintiffs' Standards and redrawn many of the graphics so that it could convert Plaintiffs' Standards into different formats. Upon information and belief, in retyping and redrawing the information, Public Resource did not undertake the same quality control procedures that Plaintiffs use before they publish their standards to ensure that the published standards reflect the actual standards that the technical committees approved.

131. When posting unauthorized copies of Plaintiffs' Standards on its website, Public Resource has included the relevant Plaintiff's registered logo on each standard in addition to that Plaintiff's name, which is more than is necessary to identify the SDO that authored the standard.

132. Public Resource's actions have damaged and will continue to harm Plaintiffs, consumers, and the public in general.

133. Public Resource's continued unauthorized use of Plaintiffs' trademarks is depriving Plaintiffs of the ability to control the use of their trademarks, which has caused and will continue to cause Plaintiffs to lose control over their brand identities, their goodwill and their reputations.

134. Mistakes Public Resource made in retyping or redrawing content from Plaintiffs' Standards could cause harm to consumers and/or the public in general, which would in turn cause harm to the reputation of the SDO that created that standard.

**V. DEFENDANT'S DESIRED OUTCOME WOULD DESTROY THE VIABILITY OF A SYSTEM THAT IS OPERATING EFFECTIVELY.**

135. If Public Resource were to succeed in convincing the Court that the copyright covering a standard was destroyed when the government incorporates the standard by reference into regulations, the SDOs would lose their exclusive rights to copy and distribute their standards and create derivative works therefrom, and would be unable to charge fees to members of the industry or other interested persons who want copies of the standards.

136. Plaintiffs are not-for-profit entities. Plaintiffs underwrite the substantial costs of developing standards, in whole or in significant part, by relying on revenues made possible from the sales and licensing of their copyrighted standards to the audiences that consume them, primarily in the course of professional activities. Revenue from the sale or licensing of Plaintiffs' copyrighted works yields a substantial part—and often the majority—of Plaintiffs' ASTM's, NFPA's and ASHRAE's operating revenues, with revenues from membership dues, contributions, and other sources usually trailing far behind.

137. Depriving Plaintiffs and other SDOs of this important, independent source of revenue would substantially diminish the quality of future standards, including those in the health and safety areas which are most suitable for use by government entities. To the extent that

Plaintiffs were able to continue their standards development activities without copyright revenues, they could be forced to rely on funding from interested parties, or to charge fees to participate in the process of developing the standards, which would inhibit the participation of small businesses, consumers, academics, and other important stakeholders in the standards development process.

138. If SDOs could no longer rely on the revenue derived from sales and licensing of their copyrighted standards to fund future standards work, they may also decrease the number of standards they develop, which would require the government to develop certain standards independently. However, the government lacks, among other things, the funds, the experience, and the technical expertise that would be needed to create standards that are comparable to those the SDOs develop.

139. As explained above, the development of standards is a complex and resource-intensive process that requires, among other things, a professional staff, the housing and administration of the process, planning and execution of committee meetings, and technology infrastructure that facilitates the collaboration and participation of a diverse membership. If the federal government were to develop standards independently, it could cost tax payers hundreds of millions of dollars, which would be diverted away from other mission-critical programs (or require higher taxes).

140. The government does not have experience and technical expertise that is comparable to those possessed by the SDOs and their members. The government also does not have the flexibility to update and revise standards at any time as do the SDOs, which would make it difficult for the government to react quickly to advances in technology and respond to other industry changes.

141. Public Resource's efforts to vitiate Plaintiffs' copyright protection in their standards threatens to destroy the open, cooperative system that has functioned effectively for over a century. This system has allowed the government and the public to benefit from the adoption of high quality standards, which Plaintiffs make available to interested members of the public, while allowing SDOs to pay for their operating costs by charging reasonable fees to members of the public interested in downloading or obtaining hard copies of their standards.

**COUNT I**  
**COPYRIGHT INFRINGEMENT**

142. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 141 of the Complaint as if fully set forth herein.

143. As alleged above, ASTM owns registered copyrights for the standards listed in Exhibit A.

144. As alleged above, NFPA owns registered copyrights for the standards listed in Exhibit B.

145. As alleged above, ASHRAE own registered copyrights for the standards listed in Exhibit C.

146. Plaintiffs' Standards contain material that is wholly copyrightable subject matter under the laws of the United States.

147. The content of each of Plaintiffs' Standards is original to the respective Plaintiff and includes a high degree of creativity. Each Plaintiff selected the words and drawings that it used to express the concepts underlying its standards from myriad options through which it could have expressed these concepts.

148. Notwithstanding Plaintiffs' ownership of the original content in Plaintiffs' Standards, Public Resource purchased copies of Plaintiffs' Standards and then made copies of

Plaintiffs' Standards and displayed copies of the Plaintiffs' Standards on its website without Plaintiffs' consent. Public Resource also rekeyed some of Plaintiffs' Standards and displayed copies of these standards on its website.

149. Public Resource had access to each of Plaintiffs' Standards, which it has displayed in a form identical, or nearly identical, to that in which they appear in Plaintiffs' publications of these standards.

150. By copying the standards listed in Exhibits A, B, and C and displaying them online, Public Resource has infringed Plaintiffs' copyright in each of Plaintiffs' Standards, specifically the exclusive right of Plaintiffs to reproduce, distribute, display, and make derivative works of their copyrighted works under 17 U.S.C. §§ 106 (1), (2), (3) and (5). The infringement of each of Plaintiffs' Standards constitutes a separate act of copyright infringement.

151. Public Resource's conduct in copying, displaying, distributing, and creating derivative works of Plaintiffs' Standards has been knowing, willful and/or intentional.

152. Public Resource has not added new expression, meaning, or insight to Plaintiff's Standards. It has simply made unauthorized copies of Plaintiffs' Standards and posted them online, sometimes in different electronic file formats.

153. Public Resource has copied, displayed, and distributed Plaintiffs' Standards in their entirety.

154. Public Resource claims to be a non-profit corporation, but it stands to profit from the display and distribution of Plaintiffs' Standards by driving traffic to its website, where it solicits donations, and by increasing its own profile in the media.

155. Public Resource's display and distribution of Plaintiffs' Standards on its website destroys the potential market for, and value of, Plaintiffs' Standards. Members of the public will

not be willing to pay for Plaintiffs' publications of their standards if unauthorized copies are available for free on Public Resource's website. Moreover, by using Plaintiffs' standards to drive traffic to its website, Public Resource diverts traffic away from Plaintiffs' websites, depriving them not only of revenues related to web traffic but also of valuable opportunities to inform and educate visitors concerning important safety and other mission-related issues.

156. Public Resource's copyright infringement has caused and will continue to cause irreparable harm to Plaintiffs for which there is no adequate remedy at law and Plaintiffs are entitled to and seek injunctive relief as a result thereof pursuant to 17 U.S.C. § 502.

**COUNT II**  
**CONTRIBUTORY COPYRIGHT INFRINGEMENT**

157. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 156 of the Complaint as if fully set forth herein.

158. Public Resources' stated purpose of rekeying certain of Plaintiffs' Standards and displaying them on its website in html format without Plaintiffs' consent was to allow for members of the public to manipulate Plaintiffs' Standards, including resizing of drawings as well as cutting and pasting formulas.

159. Public Resource knowingly displayed and distributed unlawful copies of Plaintiffs' Standards with the intent to induce, enable, facilitate and/or materially contribute to others making unauthorized copies and derivative works of Plaintiffs' Standards, and continues to do so.

160. On information and belief, given the express purpose of Defendant's posting of Plaintiffs' standards, it is likely that members of the public have accessed the copies of Plaintiffs' Standards that Public Resource displayed on its website and made copies of and/or derivative works based on Plaintiffs' Standards.

161. Public Resource's contributory copyright infringement has caused and will continue to cause irreparable harm to Plaintiffs for which there is no adequate remedy at law.

**COUNT III**  
**INFRINGEMENT OF REGISTERED TRADEMARKS UNDER 15 U.S.C. § 1114**

162. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 161 of the Complaint as if fully set forth herein.

163. As alleged above, ASTM owns all rights, title and interest in the U.S. trademark registrations for the ASTM Marks.

164. As alleged above, NFPA owns all rights, title and interest in the U.S. trademark registrations for the NFPA Marks.

165. As alleged above, ASHRAE owns all rights, title and interest in the U.S. trademark registrations for the ASHRAE Marks.

166. In copying and displaying Plaintiffs' Standards, Public Resource has used in commerce a reproduction or copy of Plaintiffs' registered trademarks in connection with the sale, offer for sale, distribution or advertising of goods or services without Plaintiffs' authorization or consent.

167. Public Resource's use in commerce of trademarks that are confusingly similar, and indeed identical, to Plaintiffs' registered trademarks is likely to cause confusion, to cause mistake and/or to deceive consumers as to the source, sponsorship, or origin of the standards Public Resource has posted on its websites.

168. The aforesaid acts of Public Resource constitute trademark infringement in violation of Section 32 of the Lanham Act, 15 U.S.C. §§ 1114.

169. The aforesaid acts of Public Resource have been and continue to be intentional, willful and in bad faith.

170. Plaintiffs have been and are likely to be damaged by Public Resource's infringing and unlawful acts.

171. The acts of Public Resource have caused and, unless enjoined by this Court, are likely to continue to cause Plaintiffs to suffer irreparable harm to their business, reputation and goodwill.

172. Plaintiffs have no adequate remedy at law and are entitled to and seek injunctive relief as a result thereof pursuant to 15 U.S.C. § 1116.

**COUNT IV**  
**UNFAIR COMPETITION AND FALSE DESIGNATION OF ORIGIN UNDER 15 U.S.C.**  
**§ 1125(A)(1)**

173. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 172 of the Complaint as if fully set forth herein.

174. As alleged above, ASTM owns all rights, title and interest in the ASTM Marks.

175. As alleged above, NFPA owns all rights, title and interest in the NFPA Marks.

176. As alleged above, ASHRAE owns all rights, title and interest in the ASHRAE Marks.

177. Each of the ASTM Marks, NFPA Marks, and ASHRAE Marks is distinctive and/or has acquired secondary meaning.

178. Plaintiffs have used their marks in commerce continuously and extensively in the United States for many years. As a result, the public associates each of Plaintiffs' marks with the relevant Plaintiff and Plaintiffs have built up valuable goodwill in their respective trademarks.

179. Public Resource has used and continues to use Plaintiffs' marks on its copies of and/or rekeyed versions of Plaintiffs' Standards, without license or authorization from Plaintiffs.

180. Public Resource's use of the ASTM Marks, NFPA Marks, and ASHRAE Marks is likely to cause confusion, to cause mistake and/or to deceive consumers as to the affiliation, connection, or association of Public Resource with Plaintiffs and/or as to the origin, sponsorship or approval of the standards posted on Public Resource's website.

181. The aforesaid acts of Public Resource have been and continue to be intentional, willful and in bad faith.

182. Plaintiffs have been and are likely to be damaged by Public Resource's infringing and unlawful acts.

183. The acts of Public Resource have caused and, unless enjoined by this Court, are likely to continue to cause Plaintiffs to suffer irreparable harm to their business, reputation and goodwill.

184. Plaintiffs have no adequate remedy at law and are entitled to and seek injunctive relief as a result thereof.

**COUNT V**  
**TRADEMARK INFRINGEMENT UNDER COMMON LAW**

185. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 184 of the Complaint as if fully set forth herein.

186. As described above, ASTM owns all rights, title and interest in and to the ASTM Marks.

187. As described above, NFPA owns all rights, title and interest in and to the NFPA Marks.

188. As described above, ASHRAE owns all rights, title and interest in and to the ASHRAE Marks.

189. The ASTM Marks, NFPA Marks, and ASHRAE Marks are distinctive and Plaintiffs have built up valuable goodwill in their respective trademarks.

190. Public Resource's use of the ASTM Marks, NFPA Marks, and ASHRAE Marks infringes Plaintiffs' rights therein and is likely to cause confusion, to cause mistake and/or to deceive consumers as to the source, sponsorship and origin of the standards posted on Public Resource's website.

191. The aforesaid acts of Public Resource constitute trademark infringement in violation of common law.

192. The aforesaid acts of Public Resource have been and continue to be intentional, willful and in bad faith.

193. Plaintiffs have been and are likely to be damaged by Public Resource's infringing and unlawful acts.

194. The acts of Public Resource have caused and, unless enjoined by this Court, are likely to continue to cause Plaintiffs to suffer irreparable harm to their business, reputation and goodwill.

195. Plaintiffs have no adequate remedy at law and are entitled to and seek injunctive relief as a result thereof.

#### **PRAYER FOR RELIEF**

Wherefore, Plaintiffs pray for judgment against Defendant as follows:

(1) That Defendant, its officers, agents, servants, employees and attorneys, and all those in active concert with it or in participation with it, be permanently enjoined from all further unauthorized reproduction of any standards published by Plaintiffs, preparation of derivative

works based upon any standards published by Plaintiffs, and distribution of copies of any standards published by Plaintiffs by any means or method.

(2) That Defendant, its officers, agents, servants, employees and attorneys, and all those in active concert with it or in participation with it, be permanently enjoined from the unauthorized use of the ASTM Marks, NFPA Marks, and/or ASHRAE Marks, as well as any colorable imitations thereof or confusingly similar marks.

(3) That the Defendant be directed to file with the Court and serve upon Plaintiffs, within 30 days after entry of final judgment, a report in writing and under oath setting forth in detail the manner and form by which Defendant has complied with the provisions set forth in Paragraphs 1 and 2 of this Prayer for Relief.

(4) That Plaintiffs be entitled to recover their reasonable attorneys' fees, costs of suit and interest.

(5) That Plaintiffs be awarded any and all such other and further relief as this Court shall deem just and proper.

Dated: August 6, 2013

Respectfully submitted,

/s/ Michael F. Clayton

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**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

|  |                                   |
|--|-----------------------------------|
| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
|--|-----------------------------------|

**PLAINTIFF NATIONAL FIRE PROTECTION ASSOCIATION, INC.'S  
OPPOSITION TO MOTION TO COMPEL DISCOVERY**

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## **I. INTRODUCTION**

Defendant Public.Resource.Org, Inc. (“Public Resource”) has rushed into court with a motion to compel that is premature and in clear violation of this Court’s rules. For that reason alone, the motion should be denied. The parties have been negotiating over the scope and burden of each other’s discovery requests, a process that was ongoing when Public Resource filed the present motion without any prior notice to Plaintiff National Fire Protection Association, Inc. (“NFPA”). The Court’s rules sensibly forbid this ambush strategy, to avoid burdening the Court and the parties with motion practice until it is clear that common ground cannot be reached. In an additional violation of the Court’s rules, Public Resource failed to submit a statement that the required discussion with NFPA occurred prior to the filing of this motion—a statement it could not make, since such discussion never occurred.

Even if this Court were inclined to disregard Public Resource’s failure to comply with the Court’s rules, its motion should be denied on the merits. Public Resource’s discovery requests are overbroad and seek to impose onerous discovery burdens on NFPA without any reasonable expectation that they will lead to the discovery of relevant or admissible evidence. The burden outweighs any potential benefit.<sup>1</sup>

## **II. BACKGROUND**

Plaintiffs are three not-for-profit organizations that develop private-sector standards to advance public safety, ensure compatibility across products and services, facilitate training, and spur innovation. Dkt. 1 ¶ 1. For example, NFPA develops the National Electrical Code, which helps ensure that electrical systems are installed safely and in a consistent manner. The standards developed by Plaintiffs are original works protected from infringement under the

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<sup>1</sup> NFPA understands that co-Plaintiffs will also be filing response briefs in opposition to Public Resource’s motion to compel, and NFPA respectfully joins in those oppositions.

Copyright Act. Government entities frequently incorporate these private standards by reference in statutes, regulations, or ordinances. *Id.* The process of developing standards is costly, and Plaintiffs rely on revenues from the sales and licensing of their copyrighted standards to help underwrite those costs. *Id.* ¶ 136. Plaintiffs brought this copyright and trademark action to stop Defendant Public Resource from copying Plaintiffs' copyrighted standards, posting the standards in their entirety on its public website, and encouraging the public to disregard Plaintiffs' copyrights and copy, distribute, and create derivative works of the standards. *Id.* ¶ 3.

The parties have been engaged in discovery for the last several months. The parties had extensive telephonic meet-and-confers, on April 21 and May 7, 2014. On May 23, NFPA responded to several of Public Resource's concerns regarding NFPA's discovery responses and proposed reasonable accommodations with respect to many of them. Notwithstanding Public Resource's sudden rush into Court now, for several months Public Resource sat silent. Having received no response from Public Resource, on August 22 NFPA sent a further letter to Public Resource noting that NFPA could not complete its document collection and production efforts until Public Resource responded to its May 23 letter; NFPA requested a response from Public Resource within two weeks, or by September 5. Declaration of Kathleen Lu (Dkt. 41-2) ("Lu Decl."), Ex. 12. On September 5, Public Resource sent a letter in response, which responded to NFPA's proposals by accepting some portions of them and making counter-proposals on others. Lu Decl. Ex. 14. Neither this letter nor any previous communication from Public Resource makes any mention of any potential motion. *Id.* Less than two weeks later on September 15—while NFPA was preparing its response to Public Resource's letter, including potential areas of further compromise—Public Resource filed this motion to compel.

Before filing this opposition, Plaintiffs emailed Public Resource to notify it of its failure to comply with the Local Rules, asking Public Resource to withdraw its motion and offering to meet and confer on the issues raised by the motion. Declaration of M. Andrew Zee Ex. 2. Public Resource declined to withdraw its motion, instead insisting that Plaintiffs either agree not to oppose the motion or identify the issues which they believed the parties could narrow. *Id.* In response, Plaintiffs again explained that they believed the parties could reach resolution on the issues raised by the motion, and asking Public Resource to withdraw its motion and meet and confer on these issues, as required by the Local Rules. *Id.* Public Resource declined this further invitation. *Id.*

### **III. ARGUMENT**

#### **A. Public Resource Failed to Comply with the Local Rules, Which Are Designed to Encourage Parties to Attempt to Resolve Their Discovery Disputes Before Burdening the Court.**

The Local Rules require that, “[b]efore filing any nondispositive motion in a civil action, counsel shall discuss the anticipated motion with opposing counsel in a good-faith effort to determine whether there is any opposition to the relief sought and, if there is, to narrow the areas of disagreement.” Local Rule 7(m). The same rule additionally requires a party to “include in its motion a statement that the required discussion occurred, and a statement as to whether the motion is opposed.” *Id.*

Public Resource has complied with neither of these requirements. As noted, the parties have met and conferred and exchanged several discovery letters over the last several months. NFPA consistently expressed its desire to “reach[] amicable resolutions on the range of discovery issues that will allow the parties to litigate this action,” and made a number of compromise proposals to that end. Lu Decl. Ex. 12, at 8. The latest discovery communication from Public Resource to NFPA was a letter on September 5, 2014, sent two weeks after NFPA

provided its own proposals, in which Public Resource accepted some portions of them and made counter-proposals on others. Lu Decl. Ex. 14. Less than two weeks later, while NFPA was in the process of formulating its responses and further areas of compromise, Public Resource filed this motion. Neither its September 5 letter nor any previous communication from Public Resource makes any mention of any potential motion. *Id.*

Such action is plainly insufficient to comply with the Local Rule. “Because the Rule seeks to promote actual resolution of nondispositive disputes, its focus is on substance, not form, and thus ‘[t]he obligation to confer may not be satisfied by perfunctory action, but requires a good faith effort to resolve the nondispositive disputes that occur in the course of litigation.’” *U.S. ex rel. K & R Ltd. P’ship v. Massachusetts Hous. Fin. Agency*, 456 F. Supp. 2d 46, 52 (D.D.C. 2006) (quoting *United States ex rel. Pogue v. Diabetes Treatment Centers of America*, 235 F.R.D. 521, 529 (D.D.C. 2006)). Dismissal of this motion will permit the parties to continue to discuss their differences over the discovery issues in the case and to appropriately narrow the range of disagreement, should any such disagreement ultimately need to be presented to the Court. *See, e.g., Ellipso, Inc. v. Mann*, 460 F. Supp. 2d 99, 102 (D.D.C. 2006) (“The purpose of the Local Rule is to promote the resolution of as many litigation disputes as possible without court intervention, or at least to force the parties to narrow the issues that must be brought to the court. ... If a party files a nondispositive motion without certifying its compliance with Rule 7(m), the motion will be denied.”).

**B. In the Alternative, Public Resource’s Motion Should be Denied on the Merits**

**1. Collecting Licensing Agreements Beyond what NFPA Has Already Agreed to Produce Would be Unduly Burdensome**

Public Resource’s first request is that NFPA produce “[a]ll documents constituting, comprising, or concerning licenses with respect to any Work-At-Issue.” Mot. 4. Public

Resource misrepresents the position that NFPA has taken regarding this request. NFPA has agreed to conduct a reasonable search and produce the current version of any license agreements relating to the standards at issue contained in NFPA's contracts database, as well as any responsive documents in NFPA's SharePoint database of copyright permission letters. Lu Decl. Ex. 12, at 3. As explained in the declaration of Dennis Berry that accompanies this opposition, it would be unduly burdensome for NFPA to collect any additional documents beyond the permissions and licenses contained in its primary databases. Declaration of Dennis J. Berry ("Berry Decl.") ¶¶ 4, 7. Older versions of licenses and copyright permissions are not centrally stored or filed, and in many cases are not stored electronically at all; retrieving these documents would impose a significant burden. *Id.*

Nor would such an effort serve any purpose in this case. There is no reason why Public Resource would need NFPA to take extraordinary measures to identify and produce outdated licenses and years-old copyright permissions. In its motion, Public Resource contends that license agreements are relevant to the question of how much revenue NFPA receives from licensing its standards, and to the question of whether NFPA is engaged in any licensing that violates public policy. Mot. 5. These issues relate to NFPA's current licensing practices, not to long-expired licensing practices. The current versions of license agreements and recent copyright permissions are the only documents that are relevant to the issues identified by Public Resource in its motion. Public Resource has never responded to NFPA's proposal on this issue, nor has Public Resource explained why the production actually offered by NFPA would be insufficient. To the extent that Public Resource seeks additional discovery beyond the reasonable approach outlined by NFPA, its motion should be denied. *See* Fed. R. Civ. P. 26(b)(2) ("[T]he court must limit the ... extent of discovery otherwise allowed by these rules ...

if it determines that ... the burden or expense of the proposed discovery outweighs it likely benefit.”). At a minimum, the Court should permit the parties to continue to meet and confer on this issue to determine whether a reasonable compromise can be reached.

**2. Collecting Each Individual Assignment of Rights Agreement Would be Unduly Burdensome and Serve No Purpose in this Litigation**

Public Resource seeks agreements between NFPA and persons who participated in the standards process. As NFPA has consistently explained to Public Resource, NFPA requires all persons who participate in the standards process to fill out NFPA’s standard form assigning all rights in the final work to NFPA. Lu Decl. Ex. 12, at 10. As explained in the Declaration of Christian Dubay that accompanies this opposition, NFPA does not accept comments or contributions without receiving an assignment of rights from the contributor. Declaration of Christian Dubay (“Dubay Decl.”) ¶ 3. The assignment of rights is invariably executed via the standard form agreement that NFPA has agreed to produce, with extremely isolated exceptions. *Id.* ¶ 4. And NFPA’s Reports on Proposals (or “ROPs”), and Reports on Comments (or “ROC”), which NFPA already has produced, identify the names of all individuals who submit comments and proposals after executing the standard-form assignment of rights. Lu Decl. Ex. 12, at 10.

Public Resource’s motion is not entirely clear, but it appears to contemplate the production of every single executed assignment form. Such production would be extremely burdensome and would serve no purpose in this litigation. Because NFPA collects assignments of rights on standard forms, and does not accept contributions without accompanying assignments of rights, production of the standard form is sufficient to enable Public Resource to assert any claims or defenses based on the effectiveness of this assignment. It is unreasonable for Public Resource to insist that NFPA must produce the actual copies of the thousands of individual forms, many of which are not stored electronically but are held in a physical location.

Dubay Decl. ¶¶ 5-6. These documents would be extremely burdensome to collect, review, and produce—and such production would serve no purpose because the documents are all identical.<sup>2</sup>

Moreover, Public Resource offers only speculation to justify this request, suggesting without any basis that it seeks to investigate “any defects that may be present in an individual assignment.” Mot. 7. This is a fishing expedition of the sort that courts routinely deny. *See, e.g., Harris v. Koenig*, 271 F.R.D. 356, 369 (D.D.C. 2010) (denying motion to compel where parties sought “a large amount of information based on the theoretical foundation that there is a possibility that they might find a conflict of interest”). This request is especially unreasonable because Public Resource does not claim that any purported author has objected to NFPA’s assertion of copyright in the works at issue (nor, of course, does Public Resource itself claim to be the author of the works at issue). Under these circumstances, Public Resource lacks any good-faith basis to assert lack of copyright ownership as a third-party defense on behalf of others who have not objected to NFPA’s copyrights. *Cf. Law Enforcement Training & Research Assocs. v. City & Cnty. of San Francisco*, 90-15482, 1991 WL 172416, at \*1 (9th Cir. Sept. 4, 1991) (noting that courts should give extra scrutiny to a copyright defendant’s claim that the plaintiff lacks copyright ownership when this claim is invoked “solely as a third party defense and the asserted copyright holder has knowingly acquiesced to the plaintiff’s commercial use of the work”). Public Resource’s motion should be denied.

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<sup>2</sup> If the Court were to decide that Public Resource is entitled to inspect each and every assignment of rights, NFPA would propose that it make the physical records available for Public Resource’s inspection, rather than using the parties’ resources to produce copies of these materials. *See White v. U.S. Catholic Conference*, CIV.A.97-1253TAF/JMF, 1998 WL 429842, at \*4 (D.D.C. May 22, 1998) (“Fed. R. Civ. P. 34 requires only that the documents be made available for inspection and copying.”).

**3. NFPA Has Agreed to Produce Appropriate Information About its Finances**

Public Resource requests documents “sufficient to identify all Contributions in support of the Standards Process of each Work-At-Issue.” Mot. 7. Again, Public Resource misrepresents NFPA’s position on this topic, inaccurately asserting that NFPA “has agreed to produce only ‘Reports on Proposals,’ or ‘ROPs’, and ‘Reports on Comments’, or ‘ROCs’, neither of which provide any information relating to financial contributions.” Mot. 9. In the very letter that Public Resource cites for this assertion, NFPA actually said that it “will produce its annual, year-end financial reports for the past five years.” Lu Decl. Ex. 6, at 12. These financial statements are more than adequate to provide the information sought by Public Resource through this discovery request, such as the fact that NFPA depends heavily on licensing revenue from its copyrighted works at issue in this case.

As NFPA further noted in its Objections to Public Resource’s Request for Production, the language of Public Resource’s request is vague and overly broad. *Id.* The definition of Contributions could be interpreted to cover every expenditure made in connection with the process of developing 22 lengthy copyrighted works. There is no need for such exhaustive review of the day-to-day financial operations of NFPA—the financial statements will provide Public Resource with ample information regarding the sources of NFPA’s overall revenues and expenses, and Public Resource will be free to request additional, more specific information should it identify particular areas where it believes more information is necessary. The motion should be denied with respect to this request.

**4. The Court Should Permit NFPA to Exclude Documents Relating to this Litigation From Production**

Public Resource seeks documents “relating to this litigation or the possibility of taking legal action against Public Resource or its principal Carl Malamud.” Mot. 9. NFPA has agreed

to conduct a reasonable search for documents referring to Public Resource or to Mr. Malamud, but has proposed excluding documents related to this lawsuit or the possibility of bringing this lawsuit from its production. Given that such documents are overwhelmingly privileged, courts routinely permit parties to exclude from production entire categories of documents that were prepared during litigation or in anticipation of litigation. *See, e.g., Arista Records LLC v. Lime Grp. LLC*, 06 CV 5936 KMW, 2011 WL 813481, at \*5 (S.D.N.Y. Feb. 28, 2011) (imposing limits on party's request to require opposing party to review documents referring to that party because "such a review is likely to involve communications that occurred during the pendency of this lawsuit and center on the subject of this lawsuit"); *S.E.C. v. Thrasher*, 92 CIV. 6987 (JFK), 1996 WL 125661, at \*1 (S.D.N.Y. Mar. 20, 1996) (denying party's request for "production of all communications between defense counsel concerning the lawsuit"); *In re Imperial Corp. of Am.*, 174 F.R.D. 475, 476, 479 (S.D. Cal. 1997) (permitting party "to assert privilege and work-product protections on a categorical basis," which included party's request to categorically exclude any documents that were "prepared to assist in anticipated or pending litigation"). Public Resource also is misguided in its assertion that a document-by-document privilege log is always required. Courts regularly affirm the assertion of privilege based on a description of categories of documents rather than a document-by-document list, when creation of a more detailed privilege log would have little benefit and would be "overly burdensome." *Imperial, supra*, 174 F.R.D. at 479; *S.E.C. v. LovesLines Overseas Mgmt., Ltd.*, Misc. No., 04-302RWRAK, 2007 WL 581909, n. 5 (D.D.C. Feb. 21, 2007).

At a minimum, Public Resource's motion on this point is premature. The documents Public Resource submits in support of its motion reveal that the parties are still in the process of negotiating over custodians of documents to be searched, search terms to be applied, and date

ranges for production of documents. *See, e.g.*, Lu Decl. Exs. 12, 14. Once these issues have been resolved, NFPA will be in a better position to assess the burden of logging each and every document that refers to this litigation.

**5. Information Regarding Legal Authorities that Incorporate NFPA's Standards is Just As Available to Public Resource as to NFPA**

Public Resource next argues that NFPA should be required to produce documents “sufficient to identify every Legal Authority that incorporates each Work-at-Issue, either expressly or by reference.” Mot. 11. This request is improper because it pertains entirely to information that is in the public domain, and that is equally available to Public Resource as it is to NFPA. Nonetheless, NFPA has agreed to produce the current version of its internal database that tracks instances of incorporation by reference. Lu Decl. Ex. 12, at 10. NFPA generally monitors incorporation of its standards by means of this database, but cannot guarantee that it has necessarily been made aware of every last jurisdiction to have incorporated part or all of an NFPA standard. *Id.* To the extent that Public Resource is demanding that NFPA conduct additional inquiries to determine whether there are instances of incorporation by reference not captured by its database, this amounts to a request that NFPA conduct legal research on Public Resource's behalf. NFPA should not be responsible for searching for publicly available information about the laws of states and municipalities across the country. Collecting this information would be just as burdensome for NFPA as for Public Resource.

**6. NFPA's ROPs and ROCs Fully Address Public Resource's Requests**

Finally, Public Resource argues that NFPA's ROPs and ROCs are not sufficiently responsive to several of Public Resource's document requests. This argument appears to be based on Public Resource's misunderstanding of the contents of the ROPs and ROCs. Public Resource incorrectly asserts that these documents are “simply summaries” of the comments and

input that go into the development of NFPA standards. Mot. 13. That is incorrect. The ROPs and ROCs function as comprehensive records of the standards development process. Dubai Decl. ¶ 9. These documents compile and reproduce every proposal and every comment that is received when the standards are being developed. *Id.* ¶ 10. These documents also identify the individuals or entities that submitted each comment or proposal. (In some cases, multiple entities submit the same proposal, generally as part of a letter-writing campaign. In instances like this, the ROP reproduces the proposal along with a list of the submitters.) *Id.* ¶ 11. The ROPs and ROCs further identify the members of each committee that worked on the proposals, and detail the votes of the committees on each proposal. These are voluminous and comprehensive documents. For example, for the 2011 version of NFPA’s largest standard, the National Electrical Code (“NEC”), the ROP is 1209 pages and the ROC is 689 pages.<sup>3</sup>

Public Resource does not identify any actual deficiencies in the responsiveness of NFPA’s production, nor does it identify any information that it seeks that is not found in these documents. Public Resource simply demands further documents without reason. Moreover, it would be highly burdensome for NFPA to collect, review, and produce further documents beyond the ROPs and ROCs. Because the ROPs and ROCs are intended to serve and do serve as the complete record of proceedings for NFPA standards development, NFPA does not actively maintain additional records in a manner that is easily accessible. For all standards revisions prior to 2010, the underlying committee materials are not stored electronically, but are kept physically. Dubai Decl. ¶ 14. Collecting these documents would involve physically gathering, reviewing and copying tens of thousands of pages of materials. *Id.* ¶ 15. Gathering all these documents would serve no purpose when the ROPs and ROCs provide the comments and proposals, the

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<sup>3</sup> These documents are publicly available at <http://www.nfpa.org/assets/files/AboutTheCodes/70/70-A2010-ROP.pdf> and <http://www.nfpa.org/assets/files/AboutTheCodes/70/70-A2010-ROC.pdf>.

identities of the submitters, and the committee comments and votes on each comment and proposal.

For standards development since 2010, NFPA does have electronically stored versions of the underlying documents. *Id.* But reviewing and producing these thousands of pages of documents would still take a significant amount of resources and time and would serve no purpose in this litigation, given that the actual record of proceedings captured in the ROPs and ROCs provides all the information sufficient to inform Public Resource about the categories of information it seeks. *See* Lu Decl. Ex. 6 (Public Resource Request No. 4 seeks “Documents sufficient to identify all Contributions in support of the Standards Process of each Work-at-Issue”; Requests Nos. 12, 13, and 15 seek documents concerning Contributions and offers of Contributions to the Standards Process for each Work-at Issue).

#### **IV. CONCLUSION**

The Court should deny Public Resource’s motion.

Dated: October 2, 2014

Respectfully submitted,

/s/ Kelly Klaus

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*Counsel for National Fire Protection Association, Inc.*

**CERTIFICATE OF SERVICE**

I hereby certify that a true and correct copy of the foregoing Opposition to Public Resource's Motion to Compel was served this 2nd day of October, 2014 via CM/ECF upon the following:

**Counsel for Public.Resource.Org, Inc.:**

Andrew Bridges

Kathleen Lu

David Halperin

Mitchell L. Stoltz

Corynne McSherry

Joseph Gratz

Mark Lemley

**Counsel for American Society for Testing and Materials d/b/a ASTM International:**

Michael F. Clayton

J. Kevin Fee

Jordana S. Rubel

**Counsel for American Society of Heating, Refrigerating, and Air Conditioning Engineers:**

Jeffrey Bucholtz

Kenneth Steinthal

Joseph Wetzel

Andrew Zee

/s/ Thane Rehn  
Thane Rehn

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA

|  |                            |
|--|----------------------------|
| AMERICAN SOCIETY FOR TESTING<br>AND MATERIALS d/b/a/ ASTM<br>INTERNATIONAL;<br><br>NATIONAL FIRE PROTECTION<br>ASSOCIATION, INC.; and<br><br>AMERICAN SOCIETY OF HEATING,<br>REFRIGERATING, AND AIR<br>CONDITIONING ENGINEERS,<br><br>Plaintiffs/<br>Counter-Defendants,<br><br>v.<br><br>PUBLIC.RESOURCE.ORG, INC.,<br><br>Defendant/<br>Counter-Plaintiff. | Case No. 1:13-cv-01215-EGS |
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**DECLARATION OF CHRISTIAN DUBAY**  
**IN SUPPORT OF PLAINTIFF NATIONAL FIRE PROTECTION ASSOCIATION**

I, Christian Dubay, declare as follows:

1. I am Vice President, Codes and Standards, and Chief Engineer for Plaintiff National Fire Protection Association ("NFPA"). My duties include managing and administering the NFPA standards development process. I have held this position since 2007. The following facts are based upon my own personal knowledge, and if called upon to do so, I could and would testify competently hereto.

2. I understand that Public Resource has requested production of the assignments of rights from persons who participated in the standards development processes for the standards at issue in this case. I also understand that Public Resource has asked the Court to compel production of these documents.

3. The NFPA does not accept comments or proposals in the standards development process without receiving an assignment of rights from the contributor. In addition, the NFPA requires persons who sit on committees in the standards development process to execute an assignment of rights.

4. The NFPA generally requires all assignments of rights to be executed on its standard form agreement. In all my time at NFPA, I am aware of only one instance in which a contributor to a NFPA standard did not use the standard form to assign his rights to the NFPA; however, this individual was required to assign all rights to NFPA.

5. Prior to 2010, the signed assignment forms were submitted physically by contributors. These documents are physically stored by the NFPA, as part of the paper and microfilm records from the standards development process from each standard. These records are voluminous and as a result some are stored offsite. For example, the records for one round of the National Electrical Code standards development process typically fill over 30 file boxes. When all the standards at issue in the case are considered, the total amount of paper records would number in the hundreds of boxes and run to tens of thousands of pages.

6. Producing the physical copies of the executed assignment of rights forms would be an onerous and burdensome undertaking. This would require physically retrieving the paper and microfilm records, and reviewing these to identify the assignments of rights forms. This would take more than a thousand hours of staff time.

7. For standards development since 2010, the records are stored electronically. These records are similarly voluminous to the pre-2010 records, and reviewing them to identify assignments of rights forms would require a similar amount of effort and staff time.

8. I understand that Public Resource has also asked for documents sufficient to identify the contributions in support of the standards at issue in this case, as well as documents concerning contributions and offers of contributions to the standards process for the standards at issue in this case.

9. The NFPA Reports on Proposals (“ROPs”) and Reports on Comments (“ROCs”) provide sufficient information to answer these requests. These reports function as comprehensive records of the standards development process, including the identities of all contributors to the process.

10. The ROPs and ROCs compile and reproduce every proposal and every comment that is received or developed when the standards are being revised or developed. These documents also identify the individuals or entities that made each proposal or comment.

11. When multiple entities submit the identical proposal or comment, such as through a letter-writing campaign, the ROP or ROC prints that proposal or comment along with the identities of those who submitted it.

12. The ROPs and ROCs also identify the members of each committee involved in the standards development process and the votes of the committee on each proposal and comment.

13. While there are additional documents used in the standards development process, such as agendas, minutes, sign in sheets, and materials distributed at the meetings, the information in these documents is generally duplicative of the information that is ultimately compiled in the ROPs and ROCs.

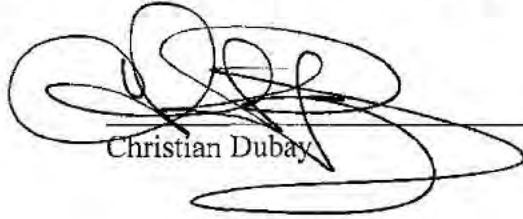
14. For standards developments that took place prior to 2010, documents beyond the ROPs and ROCs are physically stored, in a site separate from the NFPA headquarters, in either

~~paper or microfilm copies.~~ For the standards development processes since 2010, the documents are stored electronically. These documents are extremely voluminous, as described above in paragraph 5.

15. Producing these records would be an extremely onerous task. Transporting the physical documents to a site where they can be reviewed, reviewing them and copying them for production would take a significant amount of cost and staff time. In addition, reviewing the electronic records from the post-2010 time period would be extremely burdensome and time-consuming, given the volume of the documents.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed on September 30, 2014



Christian Dubay

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

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|--|-----------------------------------|
| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
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**PLAINTIFFS' MEMORANDUM OF LAW IN SUPPORT OF THEIR MOTION FOR  
SUMMARY JUDGMENT AND FOR A PERMANENT INJUNCTION**

Defendant's theory is flatly wrong, both on the facts and as a matter of basic copyright law. There is no legitimate factual dispute that Plaintiffs own 100% of the Works as the organizational authors who oversee the development of the Works, *see Veeck v. Southern Bldg. Code Cong. Int'l, Inc.*, 293 F.3d 791, 794 (5th Cir. 2003) (*en banc*), and because all contributors are either employees of Plaintiffs or are required to assign the copyright in their contributions to Plaintiffs. Prior to filing this lawsuit, Defendant itself had no quarrel with that proposition. It readily and publicly admitted that Plaintiffs authored the Works. SUMF ¶¶ 205-06. What is more, neither Plaintiffs nor Defendant is aware of a single person or entity — anywhere — other than Plaintiffs that has ever claimed to have *any* ownership interest in any of the Works. SUMF ¶¶ 26, 122, 145, 170.

For purposes of this case and this motion, however, Plaintiffs do not have to own the copyright in 100% of the Works. Although Plaintiffs do in fact own 100%, as a matter of law each Plaintiff need only have a co-ownership of the copyright in order to sue Defendant for infringement. *Davis v. Blige*, 505 F.3d 90, 98 (2d Cir. 2007). In other words, to rebut the presumption of ownership the certificates create, Defendant cannot simply show that 1%, 50% or even 75 % of the copyright in a Work is owned by someone other than the Plaintiff listed in the certificate. Defendant has to show that *100% of the copyright* is owned by other parties.

Defendant cannot come close to meeting that burden. The undisputed evidence shows that each work is a "joint work," *i.e.*, "a work prepared by two or more authors with the intention that their contributions be merged into inseparable or interdependent parts of a unitary whole." 17 U.S.C. § 101. "The essence of joint authorship is a joint laboring in furtherance of a preconcerted common design." 1 Melville B. Nimmer & David Nimmer, *Nimmer on Copyright* § 6.03 (Matthew Bener & Co. 2015). The authors to a single work can be joint authors even if

their contributions are unequal. *Id.* at § 6.07; *Maxwood Music Ltd. v. Malakian*, 713 F. Supp. 2d 327, 344 (S.D.N.Y. 2010). At a minimum, the Works are quintessential joint works, having been drafted, edited, and revised all for the common purpose of creating an integrated, unified standard. SUMF ¶¶ 30, 33, 34, 36, 109, 114, 117, 135-37.

Each of the co-authors of a joint work owns the copyright in the complete work and, in the absence of any assignment of those rights, can exercise any of the rights of ownership, including bringing a suit for infringement of the copyright by a third party and assigning its copyright to another person. *Davis*, 505 F.3d at 98 (likening co-ownership of copyright to tenancy in common); *Brownmark Films, LLC v. Comedy Partners*, 800 F. Supp. 2d 991, 997 (E.D. Wis. 2011) (assignee not required to have been assigned copyright by all co-owners of a copyright to have standing to sue for infringement). As noted, the undisputed evidence demonstrates that Plaintiffs own not just 1% but all or substantially all of the copyright in each of their respective Works. Some of the thousands of contributors of copyrighted expression to each Plaintiff's Works worked for that Plaintiff and made his/her contributions in the course and scope of his/her employment responsibilities, *i.e.*, that person's contribution was a "work made for hire." *See* 17 U.S.C. § 201(b); *Roeslin v. District of Columbia*, 921 F. Supp. 793, 797 (D.D.C. 1995); SUMF ¶¶ 34-35, 117, 137-39, 141. Additionally it is the policy of each Plaintiff to obtain written copyright assignments from each contributor to the Works, *see* 17 U.S.C. § 201(d)(2), and Plaintiffs in fact obtained these assignments from the contributors. SUMF ¶¶ 18-25; 112-15, 143-44. And, as a third-party challenger without any claim to ownership of the copyrights at issue, Defendant does not have standing to attack the validity of assignments from contributors to Plaintiffs. *See, e.g., Billy-Bob Teeth v. Novelty, Inc.*, 329 F.3d 586, 592-93 (7th Cir. 2003) (alleged infringer did not have standing to challenge the assignment of a copyright when the

With respect to the HTML materials Defendant published, Defendant instructed HTC Global to “double-key” the standards, which means that two operators independently type the text and then compare the two versions, instead of using a more accurate, but more expensive, “triple-key” methodology in which three independent operators would have typed the text. SUMF ¶190. By taking the cheaper route, Defendant knew that there could be up to 49 errors on a typical two and a half page document. SUMF ¶ 191.<sup>4</sup> Additionally, the rekeying was done by non-native English speakers in India with no technical expertise. SUMF ¶ 194. Similarly, Defendant hired Mr. Malamud’s wife’s company, Point.B Studio, which used unpaid children from a “mentoring program” whose target audience was 7-14 years old to convert formulas to MathML and drawings to SVG format for use on materials posted on Defendant’s website. SUMF ¶¶ 199-200.

Not surprisingly, like the PDF versions, the HTML versions of Plaintiffs’ standards that were posted on Defendant’s website contain errors. SUMF ¶ 215. Mr. Malamud has no explanation for these mistakes and admits that they are not acceptable. SUMF ¶ 216. Plaintiffs’ standards are technical documents that include important figures, detailed drawings, and precise measurements. These standards relate to complex scientific and technical processes and procedures that promote public health and safety and ensure the quality and consistency of goods and services. Even minor mistakes in the reproduction of Plaintiffs’ standards could lead to the production of inconsistent or dangerous goods or services. Defendant’s HTML version of the 2011 NEC, for example, contains a number of errors that distort the meaning of safety features of

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<sup>4</sup> HTC Global testified that what it described as “double-keying” would actually involve extracting text obtained using optical character recognition (“OCR”), unless the image quality of the original document was poor, in which case two operators entered the text. SUMF ¶ 192. Even Defendant’s expert admits that using OCR to capture the text from PDF versions of Plaintiffs’ standards would result in errors, particularly because they are technical documents that contain diagrams and tables. *Id.*

the standard. SUMF ¶ 219. Malamud claims that if he were notified of any mistakes, he would do a rigorous quality assurance check and correct any mistakes. SUMF ¶ 217. But even after being notified of specific errors at his deposition, Defendant did not correct these mistakes and continued to maintain versions of standards with “unacceptable mistakes” that bear Plaintiffs’ trademarks on his website and on the Internet Archive until the Court recently suggested that Defendant should take down Plaintiffs’ standards pending the resolution of this motion. SUMF ¶ 218. In any event, it is not Plaintiffs’ responsibility to perform quality control for Defendant’s infringing website.

**b. The Materials Defendant Posted Did Not Undergo Plaintiffs’ Quality Control.**

One function of a trademark is to indicate to consumers that the product has been delivered according to all quality control guidelines of the trademark owner. *Shell Oil Co. v. Commercial Petroleum, Inc.*, 928 F.2d 104, 107 (4th Cir. 1991). “Distribution of a product that does not meet the trademark holder’s quality control standards may result in the devaluation of the mark by tarnishing its image. If so, the non-conforming product is deemed for Lanham Act purposes not to be the genuine product of the holder, and its distribution constitutes trademark infringement.” *Perkins Sch. for the Blind v. Maxi-Aids Inc.*, 274 F. Supp. 2d 319, 323 (E.D.N.Y. 2003).

Defendant’s actions threaten the quality assurance function of Plaintiffs’ trademarks. The materials Defendant posted on its website and the Internet Archive did not undergo Plaintiffs’ quality control measures. *See* SUMF ¶¶ 188-201. Plaintiffs’ longstanding use of the marks in connection with their high quality standards has resulted in the public’s association of Plaintiffs’ marks with a certain quality. SUMF ¶¶ 81, 127, 151. Malamud admitted that he did not know what quality control procedures Plaintiffs use when publishing their standards. SUMF ¶ 220.

Without this knowledge, Defendant could not have complied with these quality control procedures before publishing Plaintiffs' standards on its website. Indeed, as discussed above, the materials posted by Defendant contain a variety of errors that are inconsistent with Plaintiffs' quality control standards. *See Adolph Coors Co. v. A. Genderson & Sons, Inc.*, 486 F. Supp. 131, 136 (D. Colo. 1980) (holding that defendant's distribution of beer in manner that did not comply with trademark owner's quality control standards constituted trademark infringement).<sup>5</sup>

In summary, Defendant used exact copies of Plaintiffs' marks on what it purports to be exact replicas of Plaintiffs' standards and intended for the public to believe that the materials it posted on its website were authentic versions of standards that were developed and published by Plaintiffs. Defendant's use of Plaintiffs' marks and logos in connection with materials that are not genuine versions of Plaintiffs' standards that have not undergone Plaintiffs' quality control procedures, and in fact contain mistakes, constitutes trademark infringement and false designation of origin. *See Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp.*, 34 U.S.P.Q.2d 1450, 1454 (N.D. Cal. 1995) (granting summary judgment for trademark infringement against defendant who placed modified products back into original packaging containing plaintiff's logos).

**C. Defendant's Activities Satisfy the "Use in Commerce" Requirement.**

In addition to the requirements enumerated above, the Lanham Act includes a jurisdictional requirement that there be a "use in commerce" for the conduct to be considered infringing. 15 U.S.C. § 1114(1) and 1125(a)(1). The "use in commerce" requirement "reflects

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<sup>5</sup> Even if the standards Defendant posted were exactly the same authentic standards of the Plaintiffs, Plaintiffs' inability to exercise quality control over the standards Defendant posted using Plaintiffs' trademarks means that the materials were not genuine products. "The actual quality of the goods is irrelevant; it is the control of quality that a trademark holder is entitled to maintain." *El Greco Leather Products Co. v. Shoe World, Inc.*, 806 F.2d 392, 395 (2d Cir. 1986) (holding that shoes imported by defendant that were made by same factory as genuine shoes were not "genuine" because they had not undergone quality inspection by plaintiff).

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

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| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
|--|-----------------------------------|

**DECLARATION OF DENNIS J. BERRY**  
**IN SUPPORT OF PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT**

I, Dennis J. Berry, declare as follows:

1. I am Secretary of the Corporation and Director of Licensing for the National Fire Protection Association ("NFPA"). My duties include negotiating and overseeing NFPA's licenses for its codes and standards. The following facts are based upon my own personal knowledge, and if called upon to do so, I could and would testify competently hereto.
2. NFPA owns a United States copyright registration for the 2011 edition of the National Electrical Code. Attached hereto as Exhibit A is a true and correct copy of the registration certificate for this work.

3. NFPA owns a United States copyright registration for the 2014 edition of the National Electrical Code. Attached hereto as Exhibit B is a true and correct copy of the registration certificate for this work.

4. NFPA owns a United States trademark registration for the trademark National Fire Protection Association. Attached hereto as Exhibit C is a true and correct copy of this trademark registration.

5. NFPA owns a United States trademark registration for the trademark NFPA. Attached hereto as Exhibit D is a true and correct copy of this trademark registration.

6. NFPA owns a United States trademark registration for the NFPA logo:



Attached hereto as Exhibit E is a true and correct copy of this trademark registration.

7. NFPA owns a United States trademark registration for the trademarks National Electrical Code and NEC. Attached hereto as Exhibits F and G are true and correct copies of these trademark registrations.

8. NFPA owns a United States trademark registration for the trademark NFPA 70. Attached hereto as Exhibit H is a true and correct copy of this trademark registration.

9. NFPA owns a United States trademark registration for the NEC logo:



Attached hereto as Exhibit I is a true and correct copy of this trademark registration.

10. NFPA routinely grants permission to researchers, educators, and others to use portions of NFPA standards for educational and other non-commercial purposes at no cost.

11. Attached hereto as Exhibit J is a true and correct copy of a January 22, 2015 email to me from a merchant who attempted to sell a PDF copy of the 2014 NEC on eBay without authorization from NFPA. The reseller asserted that the standard “is public domain and is readily downloadable,” and attached a link to an electronic copy of the standard posted by Public.Resource.Org as support for that assertion. This email is a business record of NFPA, recorded at the time of its receipt, created as a regular practice of NFPA to be kept and relied on by NFPA staff in the ordinary course of business.

12. Attached hereto as Exhibit K is a true and correct copy of an October 13, 2015 email to me from a merchant who attempted to use a PDF copy of the 2014 NEC as an inducement to purchase another product on the internet without authorization from NFPA. The merchant asserted that the standard is “provided for use by the public, for free,” and attached a link to an electronic copy of the standard posted by Public.Resource.Org as support for that assertion. This email is a business record of NFPA, recorded at the time of its receipt, created as a regular practice of NFPA to be kept and relied on by NFPA staff in the ordinary course of business.

13. I understand that Defendant in this case, Public.Resource.Org, recently removed NFPA's standards from its website. NFPA has not received any complaints from any persons claiming that they were unable to access NFPA standards since that time.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct and that this declaration was executed this 18<sup>th</sup> day of November 2015 at Quincy, Massachusetts.

  
DENNIS J. BERRY

# EXHIBIT A



This Certificate issued under the seal of the Copyright Office in accordance with title 17, *United States Code*, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

*Maria A. Pallante*

Acting Register of Copyrights, United States of America

Registration Number  
**TX 7-297-325**

Effective date of  
 registration:  
 December 13, 2010

**Title**

Title of Work: National Electrical Code, 2011 Edition

**Completion/Publication**

Year of Completion: 2010

Date of 1st Publication: August 25, 2010

Nation of 1st Publication: United States

**Author**

■ Author: NFPA

Author Created: text, photographs, compilation, editing, artwork

Work made for hire: Yes

Citizen of: United States

Domiciled in: United States

**Copyright claimant**

Copyright Claimant: NFPA

One Batterymarch Park, Quincy, MA, 02169, United States

Previous registration and year: 6-966-113 2008

**Rights and Permissions**

Organization Name: NFPA

Address: One Batterymarch Park  
 Quincy, MA 02169 United States

**Certification**

Name: Nancy M. Zagrodny

Date: December 8, 2010

# EXHIBIT B



This Certificate issued under the seal of the Copyright Office in accordance with title 17, *United States Code*, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

*Maria A. Pallante*

Register of Copyrights, United States of America

Registration Number  
 TX 7-935-064

Effective date of  
 registration:  
 July 25, 2014

**Title** \_\_\_\_\_

Title of Work: National Electrical Code, 2014 Edition

**Completion/Publication** \_\_\_\_\_

Year of Completion: 2013

Date of 1st Publication: November 1, 2013

Nation of 1st Publication: United States

**Author** \_\_\_\_\_

■ Author: NFPA

Author Created: text, photographs, compilation, editing, artwork

Work made for hire: Yes

Citizen of: United States

**Copyright claimant** \_\_\_\_\_

Copyright Claimant: NFPA

One Batterymarch Park, Quincy, MA, 02169, United States

**Limitation of copyright claim** \_\_\_\_\_

Previous registration and year: 7-297-325 2011

**Certification** \_\_\_\_\_

Name: Nancy M. Zagrodny

Date: July 14, 2014

# EXHIBIT J

**From:** Vacay Promo Team <vacaypromoteam@gmail.com>  
**Sent:** Thursday, January 22, 2015 11:37 AM  
**To:** Berry, Dennis <dberry@NFPA.org>  
**Subject:** Re: Ebay Violation??

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Hello Dennis,

Please visit <https://archive.org/details/nfpa.nec.2014> for details stating this is public domain and is readily downloadable not just through this site but many others.

Awaiting your response,

On Thu, Jan 22, 2015 at 2:22 PM, Berry, Dennis <dberry@nfpa.org> wrote:

Dear Sir or madam,

You asked me to contact you, but did not tell me who you are. Nevertheless, I am happy to respond and would like to discuss this with you further. Please feel free to call me at the number indicated below.

The 2014 National Electrical Code<sup>®</sup> is copyrighted by the NFPA, the title itself is a trademark of the NFPA. The Code is sold in paper and licensed in pdf format. Each pdf license includes stated restrictions that do not allow copying for further distribution. As with all NFPA standards it is available on the internet a read-only free access format. Contrary to your understanding as set out below while available in free access from the NFPA web site, it is not downloadable.

Furthermore, the NFPA has not dealt with or entered this document into creative commons. In a search of their web site just now, we could not find the Code there. If you could be more specific about where this is located, I would appreciate your direction.

As you can see from the above we do cannot accept your assertion that the document has entered the public domain and have taken steps to prevent that.

I hope this provides further information and response; again, I would be happy to discuss.

Very truly yours,

Dennis Berry

Dennis J. Berry  
Secretary of the Corporation &  
Director of Licensing

NFPA

One Batterymarch Park

Quincy, MA 02169

[dberry@nfpa.org](mailto:dberry@nfpa.org)

[617-984-7255](tel:617-984-7255)

[617-984-7222](tel:617-984-7222) (f)

CONFIDENTIALITY: This e-mail (including any attachments) may contain confidential, proprietary and privileged information, and unauthorized disclosure or use is prohibited. If you receive this e-mail in error, please notify the sender and delete this e-mail from your system.

**From:** Vacay Promo Team [<mailto:vacaypromoteam@gmail.com>]  
**Sent:** Thursday, January 22, 2015 11:42 AM  
**To:** Berry, Dennis  
**Subject:** Ebay Violation??

Hello,

I recently listed the NFPA 2014 PDF on eBay for sale and it was removed after a report of intellectual property rights being violated.

This item is public domain and not a violation of any eBay rules. The licensure for this item can be found on

JA154

CONFIDENTIAL

NFPA-PR0038553

<http://creativecommons.org/publicdomain/zero/1.0/>

**Standards Organization Source:** NFPA National Electrical Code (Free Access Available Form Original Publisher)

Once Free access is granted and available for download it is public domain and there is no violation of any law to distribute the information.

Please contact me as soon as possible with information as to how to move forward.

# EXHIBIT K

**From:** Scott Schwartz <scotts@dale-electric.com>  
**Sent:** Tuesday, October 13, 2015 3:09 PM  
**To:** Berry, Dennis <dberry@NFPA.org>  
**Subject:** RE: Use of Electronic NEC

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Dennis,

Please see the below links.

<https://law.resource.org/pub/table01.html>

<https://law.resource.org/pub/us/code/safety.html>

<https://law.resource.org/pub/us/code/ibr/nfpa.nec.2014.pdf>

This bottom link is a copy of the 2014 NEC that is provided for use by the public, for free.

If you look around the web site, you can find most of your publications online.

Scott Schwartz

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**From:** Berry, Dennis [mailto:dberry@NFPA.org]  
**Sent:** Tuesday, October 13, 2015 4:55 PM  
**To:** ScottS@Dale-electric.com  
**Subject:** Use of Electronic NEC

Dear Mr. Schwartz,

Please find enclosed a letter regarding a promotional piece which I have recently seen regarding the National Electrical Wholesale Providers. Would you please respond as soon as possible.

Very truly yours,

Dennis Berry

Dennis J. Berry  
Secretary of the Corporation &  
Director of Licensing  
NFPA  
One Batterymarch Park  
Quincy, MA 02169  
[dberry@nfpa.org](mailto:dberry@nfpa.org)  
617-984-7255  
617-984-7222 (f)

CONFIDENTIALITY: This e-mail (including any attachments) may contain confidential, proprietary and privileged information, and unauthorized disclosure or use is prohibited. If you receive this e-mail in error, please notify the sender and delete this e-mail from your system.

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA

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|--|----------------------------|
| AMERICAN SOCIETY FOR TESTING<br>AND MATERIALS d/b/a/ ASTM<br>INTERNATIONAL;<br><br>NATIONAL FIRE PROTECTION<br>ASSOCIATION, INC.; and<br><br>AMERICAN SOCIETY OF HEATING,<br>REFRIGERATING, AND AIR<br>CONDITIONING ENGINEERS,<br><br>Plaintiffs/<br>Counter-Defendants,<br><br>v.<br><br>PUBLIC.RESOURCE.ORG, INC.,<br><br>Defendant/<br>Counter-Plaintiff. | Case No. 1:13-cv-01215-TSC |
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**DECLARATION OF STEVEN CRAMER**

Pursuant to 28 U.S.C. § 1746, I, Steven Cramer, declare the following statements to be true under the penalties of perjury:

1. I am over the age of 18 years and am fully competent to testify to the matters stated in this Declaration.
2. This declaration is based on my personal knowledge. If called to do so, I would and could testify to the matters stated herein.
3. I am the Vice-Provost for Teaching and Learning and Professor of Civil and Environmental Engineering at the University of Wisconsin-Madison. My research focuses on the mechanical behavior of wood and wood-based materials, the design and analysis of wood structures, and the performance of concrete construction materials.

4. I am a member of ASTM International ("ASTM"). I have been a member of ASTM since 1986.

5. From 2006-2009, I was the Chairman of ASTM's Committee D07, which is the committee that develops standards related to wood. This committee has jurisdiction over 116 ASTM standards.

6. I understood since I joined ASTM that ASTM would own the copyright in any standards or materials I helped to develop.

7. I consider my contributions to the ASTM standard development process to be contributions to my profession and to the related industries. ASTM provides the framework that allows me to make this contribution.

8. ASTM plays a stewardship role in convening a diverse group of members, providing the infrastructure that makes it possible for members to contribute ideas, and ultimately creating a usable product that members will use and from which the entire industry will benefit.

9. The process of developing, publishing and distributing standards is expensive and someone has to pay for those costs.

10. I understood since I became a member of ASTM that ASTM sell copies of all ASTM standards and uses the revenue from its sales to support the standards development process.

11. I understood since I became a member of ASTM that if I wanted a copy of an ASTM standard, including a standard that I helped to develop, I or my institution would be required to purchase it from ASTM.

12. I have renewed my membership with ASTM using ASTM's online registration system since at least 2007. As part of that process, I indicated my agreement to the following statement: "I agree, by my participation in ASTM and enjoyment of the benefits of my annual membership, to have transferred and assigned any and all interest I possess or may possess, including copyright, in the development or creation of ASTM standards or ASTM IP to ASTM." A screen shot of the membership renewal form is attached as Exhibit 1. I understand this to mean that I have assigned any and all copyrights in standards I helped to develop from 1986 to the present to ASTM.

13. I renewed my membership in ASTM for 2016. As part of the renewal process, I agreed once again to a statement indicating that I had "transferred and assigned any and all interest I possess or may possess, including copyright, in the development or creation of ASTM standards or ASTM IP to ASTM." Attached as Exhibit 2 is a screen shot of this statement in my membership renewal.

14. I am not aware of any ASTM member who claims to own the copyright in any ASTM standard.

15. The context of ASTM's operations, including the membership forms, membership renewal forms, Intellectual Property policy, and the copyright notices on each of the ASTM standards makes it very clear to all members that ASTM owns the copyrights in all ASTM standards.

16. As the Chairman of Committee D07, I did not consider how much revenue sales of a potential standard would bring to ASTM when deciding whether to approve a work item to develop a new standard. I considered whether there was a need for the proposed standard and

whether there would be sufficient interest from a balanced group necessary to develop the standard.

17. A task group puts together the first draft of a new standard. I have participated in several task groups that have drafted proposed standards that were then revised and voted upon by ASTM subcommittees and committees. In my experience, developing a standard is an iterative process. The task group works collaboratively, with many people sharing ideas, suggesting wording and providing comments that contribute to the draft standard.

18. I have also participated in developing standards through the balloting process in subcommittees and committees. Members of the subcommittee and committee that submit ballots on a proposed standard also suggest wording and provide comments on the draft. The suggestions and comments are often incorporated into the draft.

19. The ASTM standards I have participated in developing were developed based on public demands, industry needs, and public safety concerns and advancements in technology. They address a technical issue or problem identified by a group of people in the relevant sector that can be addressed with a standard-based solution.

20. The ASTM standards I have participated in developing were not developed for the purpose of being incorporated into government regulations.

21. ASTM committees composed of technical experts make decisions about the appropriate content of the standards, including the relevant measurements, values, descriptions, and other specifications, as well as the language with which to express these standards.

22. Other standard development organizations, including the American Wood Council and the American National Standards Institute, develop standards that relate to wood.

The content, language and purpose of these SDO's standards differs from the content of the ASTM standards.

23. Since joining ASTM, I was aware that all contributions I made to the process of developing a standard would be merged with the contributions of others and would result in a single standard.

24. The task group, section, subcommittee and committee structure through which ASTM standards are developed makes it apparent to all participants that their contributions will be merged with the contributions of others and will result in a single standard.

25. ASTM staff members added certain language required by the Form and Style guide to each of the standards I helped to develop.

26. ASTM staff editors also proofread and edited each one of the standards I helped to develop prior to their publication.

Dated: November 16, 2015

  
Steven Cramer

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA

|  |                            |
|--|----------------------------|
| AMERICAN SOCIETY FOR TESTING<br>AND MATERIALS d/b/a/ ASTM<br>INTERNATIONAL;<br><br>NATIONAL FIRE PROTECTION<br>ASSOCIATION, INC.; and<br><br>AMERICAN SOCIETY OF HEATING,<br>REFRIGERATING, AND AIR<br>CONDITIONING ENGINEERS,<br><br>Plaintiffs/<br>Counter-Defendants,<br><br>v.<br><br>PUBLIC.RESOURCE.ORG, INC.,<br><br>Defendant/<br>Counter-Plaintiff. | Case No. 1:13-cv-01215-TSC |
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**DECLARATION OF JAMES GOLINVEAUX**

I, James Golinveaux, declare as follows:

1. I am a Senior Fellow of water suppression products at Tyco Fire Protection Products. The following facts are based upon my own personal knowledge and, if called upon to do so, I could and would testify competently hereto.

2. Tyco Fire Protection Products is a leading manufacturer of water-based fire suppression system components and ancillary building construction products. Tyco manufactures a wide variety of sprinklers, system valves and devices, piping and electrical products, and specialty systems for effective fire protection in commercial, industrial, institutional, and residential buildings.

3. I have more than 30 years of experience in the fire protection industry, and my particular field of expertise is in the development of fire sprinklers for use in buildings. I hold 21

United States and 29 foreign patents in automatic sprinkler technology, and I currently have 38 pending applications for United States and foreign patents. In 2014 I received the Henry S. Parmalee award, the American Fire Sprinkler Association's highest honor, in recognition of my work in the research and design of fire sprinklers to improve fire safety. As part of my professional activities, I travel around the world to deliver lectures and training on fire safety issues to a wide variety of audiences.

4. I am familiar with the work of the National Fire Protection Association ("NFPA"), and I have been personally involved in NFPA's standards development process for many years. For example, I have been a member of the NFPA 13 Technical Committee for more than 20 years. NFPA 13 is the Standard for the Installation of Sprinkler Systems. I have also been a Technical Committee member for several other NFPA standards, including NFPA 101, the Life Safety Code. In addition, I am currently a member of NFPA's Standards Council.

5. Fire safety professionals and the fire protection industry benefit greatly from the standards developed by NFPA through its voluntary consensus process. It is critical to have one central association that can attract contributors from a variety of perspectives, coordinate and host Technical Committee meetings, and ultimately develop and publish standards that reflect the broadest possible consensus about fire safety techniques and that can be used widely throughout the country.

6. NFPA's voluntary consensus process results in the creation of uniform industry-wide standards. Professionals across the industry rely on the existence of these standards, and this industry-wide uniformity could not be achieved without NFPA or a similar organization with the resources to devote to standards development.

7. It is especially important to have an independent association that brings together the expertise of many different stakeholders and creates an open and structured standards development process designed to accommodate input from many sources and achieve consensus. The voluntary consensus process is costly, but in my experience it results in the highest quality standards in the area of fire safety.

8. In my experience participating in NFPA's standards development process, I have observed the significant costs that NFPA incurs to develop its standards. I understand that this process is primarily funded by revenue obtained from the sale of NFPA publications.

9. NFPA also provides resources on which fire safety professionals rely in interpreting and implementing NFPA standards. These include expert technical staff who provide interpretations of the standards, training and education programs, and a research arm. These resources significantly enhance the value and utility of NFPA standards. I understand that these resources are primarily funded by revenue obtained from the sale of NFPA publications.

10. In my experience in the fire sprinkler industry, NFPA 13 and other standards used in the industry are accessible to the professionals who use them, including manufacturers, architects, engineers, and contractors. NFPA distributes standards through a variety of channels and in a variety of formats. Professionals who work with fire sprinklers are familiar with NFPA standards and able to obtain them with little difficulty and at reasonable cost.

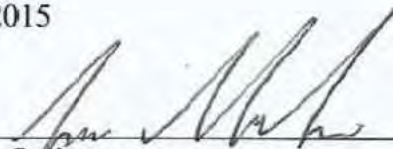
11. Before I became a member of any NFPA Technical Committees, I submitted a committee application in which I agreed that all copyrights and other rights in the Committee's work were owned by NFPA. I also agreed that, to the extent I had any rights in my work in connection with the Committee, either individually or in connection with others, I expressly assigned all such rights to NFPA.

12. In my work on NFPA Technical Committees, it has always been my express intention that my contributions to the standards would be fully owned by NFPA, and that NFPA would own the copyright in the completed standards on which I worked.

13. In my experience working on NFPA Technical Committees, all Committee members have known that NFPA publishes the final standards, owns the copyright in those standards, and affixes copyright notices to the standards. In my experience, the Technical Committee members understand and agree that all copyrights and other rights in the work of the Technical Committee is owned by NFPA.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed in QUINCY, MA on November 17, 2015

  
\_\_\_\_\_  
James Golinveaux

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

|  |                                   |
|--|-----------------------------------|
| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
|--|-----------------------------------|

**DECLARATION OF RANDY JENNINGS**

Pursuant to 28 U.S.C. § 1746, I, Randy Jennings, declare the following statements to be true under the penalties of perjury:

1. I am over the age of 18 years and am fully competent to testify to the matters stated in this Declaration.
2. This declaration is based on my personal knowledge. If called to do so, I would and could testify to the matters stated herein.
3. I am the Director of Program Operations for the Tennessee Department of Agriculture. In that role, among other responsibilities, I represent the State of Tennessee on ASTM International Committees D02, D03, D15; the National Conference on Weights and Measures and other relevant standards development organizations. I also direct and assist regulatory administrators in assessing and improving their programs; monitor the efficiency and

effectiveness of staff performance; review all enforcement actions that are submitted to the division attorney; and provide direction on enforcement options after discussing with the attorney and consulting with program administrators.

4. I am a member of ASTM International ("ASTM"). I have been a member of ASTM since 1990.

5. I am currently the Chairman of ASTM's Committee D02, which is the committee that develops standards related to petroleum products, liquid fuels and lubricants.

6. I have been an active member of several D02 subcommittees, including D01.A0 on Gasoline and Oxygenated Fuels, D02.E0 on Burner, Diesel, Non-Aviation Gas Turbine and Marine Fuels, D02.H0 on Liquefied Petroleum Gas, D02.02 on Hydrocarbon Measurement for Custody Transfer and D02.08 on Volatility for many years.

7. I understood since I joined ASTM that ASTM would own the copyright in any standards or materials I helped to develop.

8. I understood since I became a member of ASTM that ASTM sell copies of all ASTM standards and uses the revenue from its sales to support the standards development process.

9. I understood since I became a member of ASTM that if I wanted a copy of any ASTM standard, I would be required to purchase it from ASTM, including standards that I helped to develop.

10. I have renewed my membership with ASTM using ASTM's online registration system since at least 2007. As part of that process, I indicated my agreement to the following statement: "I agree, by my participation in ASTM and enjoyment of the benefits of my annual membership, to have transferred and assigned any and all interest I possess or may possess,

including copyright, in the development or creation of ASTM standards or ASTM IP to ASTM.”

A screen shot of the membership renewal form is attached as Exhibit 1. I understand this to mean that I have assigned any and all copyrights in standards I helped to develop from 1990 to the present to ASTM.

11. I am not aware of any ASTM member who claims to own the copyright in any ASTM standard.

12. The context of ASTM’s operations, including the membership forms, membership renewal forms, Intellectual Property policy, and the copyright notices on each of the ASTM standards makes it very clear to all members that ASTM owns the copyrights in all ASTM standards.

13. A task group puts together the first draft of a new standard. I have participated in several task groups that have drafted proposed standards that were then revised and voted upon by ASTM subcommittees and committees. In my experience, the task group works collaboratively, with many people, sometimes dozens of people, sharing ideas, suggesting wording and providing comments that contribute to the draft standard.

14. I have also participated in developing standards through the balloting process in subcommittees and committees. Members of the subcommittee and committee that submit ballots on a proposed standard also suggest wording and provide comments on the draft. The suggestions and comments are often incorporated into the draft.

15. I participated in the development of ASTM D975-07.

16. The ASTM standards I have participated in developing were developed based on public demands, industry needs, and public safety concerns and advancements in technology.

They address a technical issue or problem identified by a group of people in the relevant sector that can be addressed with a standard-based solution.

17. Technical committees make decisions about the appropriate content of the standards, including the relevant measurements, values, descriptions, and other specifications, as well as the language with which to express these standards.

18. Since joining ASTM, I was aware that all contributions I made to the process of developing a standard would be merged with the contributions of others and would result in a single standard.

19. The task group, subcommittee and committee structure through which ASTM standards are developed makes it apparent to all participants that their contributions will be merged with the contributions of others and will result in a single standard.

20. For each of the standards I helped to develop, ASTM staff members reviewed the draft standards and suggested editorial changes and added other information required by the Form and Style guide.

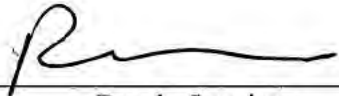
21. The Tennessee Code requires kerosene and motor oils to meet the standards set out in the most recent volume 5 of the ASTM Annual Book of Standards. *See* Tennessee Code § 47-18-1304.

22. One of the benefits of states being able to incorporate by reference the ASTM standards is that it provides different states with a common set of requirements. If each state had to create its own set of standards, there would be a patchwork of requirements, which would make it very difficult for companies to convey products that could be used in multiple states.

23. ASTM is able to convene experts with knowledge of different fuels and their components to develop its fuel standards.

24. The state of Tennessee does not have the resources or expertise to develop the broad array of standards that ASTM develops and maintains related to fuels. If Tennessee was unable to incorporate by reference the ASTM standards, it would not be able to effectively develop standards for fuel products.

Dated: November 18, 2015

  
\_\_\_\_\_  
Randy Jennings

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

|  |                                   |
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| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
|--|-----------------------------------|

**DECLARATION OF THOMAS B. O'BRIEN, JR.**

Pursuant to 28 U.S.C. § 1746, I, Thomas B. O'Brien, Jr., declare the following statements to be true under the penalties of perjury:

1. I am over the age of 18 years and am fully competent to testify to the matters stated in this Declaration.
2. This declaration is based on my personal knowledge. If called to do so, I would and could testify to the matters stated herein.
3. I am Vice President and General Counsel at ASTM International ("ASTM"). I have worked at ASTM since 2003.
4. My responsibilities include developing legal policies and procedures and addressing all legal matters for ASTM, including ASTM's copyright registrations, trademark registrations, and enforcement efforts related to ASTM's intellectual property.

5. ASTM has a copyright registration for ASTM D86-07 (Standard Test Methods for Distillation of Petroleum Products at Atmospheric Pressure) that identifies ASTM as the owner. Attached as Exhibit 1 is a true and correct copy of the certificate of registration for this standard.

6. ASTM has a copyright registration for ASTM D975-07 (Standard Specification for Diesel Fuel Oils) that identifies ASTM as the owner. Attached as Exhibit 2 is a true and correct copy of the certificate of registration for this standard.

7. ASTM publishes an Annual Book of ASTM Standards every year that is composed of a number of volumes and includes the current version of each of its standards.

8. Between 1980 and 2011, ASTM obtained copyright registrations for each volume of its Book of Standards.

9. ASTM D396-98 and ASTM D1217-93(98) were published in Volume 5.01 of the 1999 Annual Book of ASTM Standards. Attached as Exhibit 3 are true and correct copies of pages from the index of the 1999 Annual Book of ASTM Standards showing the volume in which these standards appeared.

10. ASTM has a copyright registration for Volume 5.01 of the 1999 Annual Book of ASTM Standards that identifies ASTM as the owner. The date of first publication for this work was February 22, 1999 and the effective date of registration is March 10, 1999. Attached as Exhibit 4 is a true and correct copy of the certificate of registration for the standards included in this volume.

11. The published version of each of ASTM's standards includes a copyright notice alerting the public (including the individuals who participated in the creation of the standards) to the fact that the copyright is owned by ASTM.

12. ASTM knows of no individual or other person who claims to own any copyright interest in any ASTM standard.

13. ASTM routinely grants permission to researchers, academics and others to reproduce its standards at no cost for non-commercial purposes.

14. ASTM has not licensed Defendant's use of ASTM's standards.

15. ASTM developed a guide entitled "Form and Style for ASTM Standards," which is a guide to promote uniformity of form and style in ASTM standards ("ASTM Form and Style Guide"). This guide describes certain conventions that must be followed when drafting an ASTM standard. Attached as Exhibit 5 is a true and correct copy of the ASTM Form and Style Guide.

16. The ASTM Form and Style Guide describes certain components and provides the text for certain language that must be included in every ASTM standard.

17. As part of the process of developing a draft standard, ASTM staff members add language and components that are required by the ASTM Form and Style Guide to the draft prepared by the task group.

18. For example, Standard D86-07 contains numerous components that were authored by ASTM employees. Attached as Exhibit 6 is a true and correct copy of ASTM D86-07.

19. The title of the standard (Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure) appears at the top of the first page of ASTM D86-07. Directly below the title, there is an explanation of what the designation number for the standard means. This language was drafted by an ASTM employee.

20. Footnote 1 is a standard footnote that is authored by an ASTM employee, which provides information about which committee and subcommittee have jurisdiction over the

standard. ASTM Form and Style Guide Section A26.2 lays out the requirements for the content of this footnote.

21. Footnote 2 explains how to obtain access to ASTM standards referenced in the document. This language was drafted by an ASTM employee.

22. Section 1.5 of ASTM D86-07 states: “This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.” This language comes directly from the Section F2.1 of the ASTM Form and Style Guide and was written by an ASTM employee.

23. On the last page of ASTM D86-07, there is a summary of the differences between this version of the standard and the previous version, which was compiled by ASTM employees.

24. At the very bottom of the last page of D86-07, there are three italicized paragraphs. The text of the first two paragraphs comes directly from ASTM’s Form and Style Guide, which was written by ASTM employees. *See* Form and Style Guide Sections F3.2 and F2.3.

25. The third italicized paragraph at the end of D86-07 is a statement of ASTM’s ownership of the copyright and information about how to purchase copies, which was also authored by an ASTM employee.

26. As another example, ASTM standard D975-07 contains numerous sections that were authored by ASTM employees. Attached as Exhibit 7 is a true and correct copy of ASTM D975-07.

27. Underneath the title of the standard (Standard Specification for Diesel Fuel Oils), there is an explanation of what the designation number for the standard means. This language was drafted by an ASTM employee.

28. Footnote 1 of ASTM D975-07 provides information about the committee and subcommittee that have jurisdiction over this standard. This language is required by Section B28.2 of the ASTM Form and Style Guide and was drafted by an ASTM employee.

29. Section 1.3 of ASTM D975-07 states “The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.” This language was taken verbatim from Section H3.1.1.1 of the ASTM Form and Style Guide.

30. Like ASTM D86-07, the last page of ASTM D975-07 provides a summary of changes made to the previous version of this standard and includes three italicized paragraphs, all of which were drafted by ASTM employees.

31. ASTM D396-98 also contains content that was drafted by ASTM employees. Attached as Exhibit 8 is a true and correct copy of ASTM D396-98.

32. Underneath the title of the standard (Standard Specification for Fuel Oils), there is an explanation of what the designation number for the standard means. This language was drafted by an ASTM employee.

33. Footnote 1 of ASTM D396-98 provides information about the committee and subcommittee that have jurisdiction over this standard. This language is required by Section B28.2 of the ASTM Form and Style Guide and was drafted by an ASTM employee.

34. On the last page of ASTM D396-98 there are two italicized paragraphs that were drafted by ASTM employees.

35. ASTM D1217-93(98) contains content that was drafted by ASTM employees. Attached as Exhibit 9 is a true and correct copy of ASTM D1217-93(98).

36. Underneath the title of the standard (Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer), there is an explanation of what the designation number for the standard means. This language was drafted by an ASTM employee.

37. Footnote 1 of ASTM D1217-93(98) provides information about the committee and subcommittee that have jurisdiction over this standard. This language is required by Section B28.2 of the ASTM Form and Style Guide and was drafted by an ASTM employee.

38. Section 1.5 of ASTM D1217-93(98) states: "This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use." This language comes directly from the Section F2.1 of the ASTM Form and Style Guide and was written by an ASTM employee.

39. On the last page of ASTM D1217-93(98) there are two italicized paragraphs that were drafted by ASTM employees.

40. There are a number of ways in which ASTM members assign their copyrights in the standards they help to develop to ASTM.

41. Since 2005, new members and members renewing their memberships online to ASTM agree to the following language: "I agree, by my participation in ASTM and enjoyment of the benefits of my annual membership, to have transferred and assigned any and all interest I possess or may possess, including copyright, in the development or creation of ASTM standards or ASTM IP to ASTM." Attached as Exhibit 10 is a true and correct copy of the online new

membership form and attached as Exhibit 11 is a true and correct copy of the online membership renewal form.

42. Some members of ASTM renew their memberships using paper forms that contain substantially the same language as the language in the online forms. Attached as Exhibit 12 is a true and correct copy of a paper membership renewal form.

43. Michael Collier was the technical contact for the revision of ASTM D86 that was completed in 2007.

44. Michael Collier renewed his ASTM membership every year between 2007-2014 using the online membership renewal form.

45. John Chandler was the technical contact for the revision of ASTM D975 that was completed in 2007 and for the revision of ASTM D398 that was completed in 1998.

46. John Chandler renewed his ASTM membership every year between every year between 2007-2014 using the online membership renewal form.

47. Jimmy King was the technical contact for the 1998 reapproval of ASTM D1217.

48. Jimmy King renewed his ASTM membership in 2007.

49. When an individual registers a “work item,” which starts the process of developing a new standard or amending an existing standard, that individual must agree to the following language: “I hereby grant and assign to ASTM International all and full intellectual property rights, including copyright, in the proposed draft standard/text and any contributions I make to ASTM International in connection with this proposal” and “By submitting this form, I acknowledge that all copyrights to this document, as a draft and an approved ASTM standard, are the sole and exclusive property of ASTM, in accordance with the Intellectual Property

policies of the Society.” Attached as Exhibit 13 is a true and correct copy of the online form an individual must complete to register a work item.

50. ASTM engages in quality control procedures to ensure the quality and integrity of the content of the standards.

51. ASTM staff editors edit the language of the standard to ensure that it conforms to the requirements in the Form and Style Guide.

52. ASTM staff also submits the final version to the technical committee for reviews to make sure it matches the content approved through the balloting process.

53. ASTM staff proofreads the XML versions of standards before posting them on the internet to ensure that the conversion of the text and diagrams into XML format has not altered the content of the standard.

54. ASTM has not received any complaints about lack of accessibility of its standards other than from Defendant.

55. ASTM owns a U.S. federal trademark registration for the trademark ASTM (U.S. Trademark Reg. No. 2,679,320) in connection with books featuring information on standardization of specifications and the methods of testing for various materials and products; promoting public awareness of the need for standards; educational services; and providing a website on global computer networks featuring information in the field of specifications and methods of testing for various materials and products. ASTM has used this trademark since 1962. ASTM filed a Section 15 declaration in support of the incontestability of this registration. Attached as Exhibit 14 are true and correct copies of the Certificate of Registration and the Section 15 declaration.

56. ASTM owns U.S. federal trademark registrations for the trademarks ASTM INTERNATIONAL (U.S. Trademark Reg. No. 2,685,857) and the following logo:



(U.S. Reg. No. 2,651,796) in connection with similar goods and services. ASTM has used these trademarks since 2001. ASTM filed Section 15 declarations in support of the incontestability of these registrations. Attached as Exhibit 15 are true and correct copies of the Certificates of Registration and the Section 15 declarations.

57. ASTM also owns a registration for the following logo:



(U.S. Reg. Nos. 4,079,772) in connection with publications relating to testing methods, specifications and standards in engineering, industrial and allied fields. ASTM has used this trademark since 1965. The application for this registration was filed on May 10, 2011. The Examining Attorney who reviewed the application approved it for registration without requesting proof of secondary meaning. Attached as Exhibit 16 is a true and correct copy of the Certificate of Registration.

58. ASTM expends considerable resources marketing and promoting its goods and services in connection with these trademarks every year. For example, ASTM spent over \$3 million marketing and promoting the sales of copies of its standards that feature its trademarks in catalogs, brochures, and in mail and email correspondence between 2010-2012, which were the three years immediately prior to Defendant's infringement.

59. ASTM's longstanding use of its trademarks in connection with its high quality standards has resulted in the public's association of ASTM's marks with a certain quality.

60. ASTM provides the public with free, read-only access to all ASTM standards that ASTM is aware have been incorporated by reference into federal regulations.

61. ASTM provides the public with free, read-only access to all ASTM standards that are the subject of Plaintiffs' Motion for Summary Judgment. Attached as Exhibit 17 are true and correct copies of screen shots demonstrating the availability of ASTM standards on ASTM's online Reading Room.

62. ASTM identifies standards that have been incorporated by reference into federal regulations from the database created by the National Institute of Standards and Technology.

63. ASTM publicizes the free read-only access provided on its website.

64. During the notice and comment period regarding proposed federal regulations, upon request by the relevant federal agency, ASTM provides free, read-only access to standards that are incorporated by reference in proposed regulations.

65. ASTM has not received any complaints about lack of accessibility of its standards other than from Defendant.

66. Defendant submitted comments reflecting his beliefs in connection with proposed rulemaking regarding the procedures of the Office of the Federal Register and the National

Archives and Records Administration, proposed amendments to the Office of Management and Budget's Circular A-119, and a study by the Administrative Conference of the United States.


67. During the course of this litigation, Defendant has continued to post versions of additional standards owned by ASTM that use ASTM's trademarks on its website, including as recently as October 2015.

68. Defendant has posted html versions of certain ASTM standards since Plaintiffs filed their Complaint that do not use the ASTM logo marks. Attached as Exhibit 18 is a true and correct copy of a version of ASTM F977 that Defendant posted on its website in October 2015 that does not use an ASTM logo.

69. On or about November 10, 2015, Defendant removed its versions of the standards at issue in this case from its website and from the Internet Archive at the suggestion of the Court.

70. Since the standards were taken down from Defendant's website and the Internet Archive, ASTM has not received any complaints from persons regarding any alleged inability to access ASTM's standards that have been incorporated by reference.

Dated: November 17, 2015

  
\_\_\_\_\_  
Thomas O'Brien

# EXHIBIT 1



This Certificate issued under the seal of the Copyright Office in accordance with title 17, *United States Code*, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

*Maria A. Pallante*

Register of Copyrights, United States of America

Registration Number  
**TX 7-685-941**

Effective date of  
registration:

March 5, 2013

## Title

**Title of Work:** ASTM D86-07 Standards Test Methods for Distillation of Petroleum Products at Atmospheric Pressure

## Completion/Publication

**Year of Completion:** 2007

**Date of 1st Publication:** March 1, 2007

**Nation of 1st Publication:** United States

## Author

■ **Author:** ASTM International

**Author Created:** Entire Text

**Work made for hire:** Yes

**Domiciled in:** United States

## Copyright claimant

**Copyright Claimant:** ASTM International

100 Barr Harbor Drive, West Conshohocken, PA, 19428, United States

## Limitation of copyright claim

**Material excluded from this claim:** text

**Previous registration and year:** TX 6-563-072 2007

TX 6-342-584 2006

**New material included in claim:** text, editing

## Rights and Permissions

**Organization Name:** ASTM International

**Name:** Kathleen Hooper

**Email:** khooper@astm.org

**Telephone:** 610-832-9634

**Address:** 100 Barr Harbor Drive

West Conshohocken, PA 19428 United States

## Certification

Name: Kathleen Hooper

Date: March 1, 2013

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# EXHIBIT 2



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# EXHIBIT 3



# Alphanumeric List

## ASTM Standards

### Standards:

|                |               |
|----------------|---------------|
| Specifications | 2911          |
| Test Methods   | 7403          |
| Terminology    | 186           |
| <b>Total</b>   | <b>10,500</b> |

Each ASTM standard has a unique serial designation. It is comprised of a capital letter indicating general classification (A, ferrous metals; B, nonferrous metals; C, cementitious, ceramic, concrete, and masonry materials; D, miscellaneous materials; E, miscellaneous subjects; F, materials for specific applications; G, corrosion, deterioration, and degradation of materials; ES, emergency standards; P, proposals; PS, provisional standards), a serial number (one to four digits), a dash, and the year of issue.

In each serial designation, the number following the dash indicates the year of original adoption as standard or, in the case of revision, the year of last revision. Thus, standards adopted or revised during the year 1999 have as their final number, 99. A letter following this number indicates more than one revision during that year, that is 99a indicates the second revision in 1999, 99b the third revision, etc. Standards that have been reapproved without change are indicated by the year of last reapproval in parentheses as part of the designation number, for example, (1999). A superscript epsilon indicates an editorial change since the last revision or reapproval; ε1 for the first change, ε2 for the second, etc.

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Each ASTM standard is available as a separate reprint from ASTM. Price and order information are available from ASTM Customer Service, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, 610-832-9585.

D 308

D 308 Discontinued 1940; Method of Test for Oil Content of Petroleum Waxes; Replaced by D 721

D 309 Discontinued 1943; Specification for Crushed Stone, Crushed Slag, and Gravel for Bituminous Concrete Base and Surface Courses of Pavements; Replaced by D 692

D 310 Discontinued 1988; Test Method for Size of Anthracite; Replaced by D 4749

D 311 Discontinued 1988; Method for Sieve Analysis of Crushed Bituminous Coal; Replaced by D 4749

D 312-95a Specification for Asphalt Used in Roofing, 04.04

D 313 Discontinued 1982; Method of Test for Coarse Particles in Mixtures of Asphalt and Mineral Matter

D 314 Discontinued 1970; Method of Test for Hardness of Rubber; Replaced by D 1415

D 315-95 Specification for Woven Asbestos Tape, 04.05

D 316 Discontinued 1938; Methods of Test for Chatter Tire Fabrics Other Than Cord Fabrics

D 317 Discontinued 1956; Specification for Oil Putty for Glazing

D 318 Discontinued 1976; Specification for Amyl Acetate (Synthetic) (85 to 88% grade)

D 319-95 Specification for Amyl Alcohol (Synthetic), 06.04

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D 322-97 Test Method for Gasoline Diluent in Used Gasoline Engine Oils by Distillation, 05.01

D 323-94 Test Method for Vapor Pressure of Petroleum Products (Reid Method), 05.01

D 324 Discontinued 1964; Definitions of Terms Relating to Timber Preservatives

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D 326 Discontinued 1935; Method of Compression Testing of Natural Building Stone

D 327 Redesignated C 99

D 328 Redesignated C 97

D 329-95 Specification for Acetone, 06.04

D 330-93(1997) Specification for 2-Butoxyethanol, 06.04

D 331-95 Specification for 2-Ethoxyethanol, 06.04

D 332-87(1997)<sup>1</sup> Test Method for Relative Tinting Strength of White Pigments by Visual Observation, 06.01

D 333-96 Test Methods for Clear and Pigmented Lacquers, 06.02

D 334 Discontinued 1967; Methods of Test for Cotton Goods for Rubber and Pyroxylin Coating

D 335 Discontinued 1989; Specification for Cotton Tapes Woven for Electrical Purposes

D 336 Discontinued 1938; Methods of Test for Tire Fabrics Other Than Cord Fabrics

D 337 Redesignated E 337

D 338 Discontinued 1935; Method of Test for Modulus of Elasticity of Natural Building Stone

D 339 Discontinued 1935; Method of Shear Testing of Natural Building Stone

D 340 Discontinued 1935; Definitions of Terms Relating to Natural Building Stone

D 341-93(1998) Viscosity-Temperature Charts for Liquid Petroleum Products, 05.01

D 342 Discontinued 1936; Specification for Acetate Ester of Ethylene Glycol Monoethyl Ether (90 to 91% Grade)

D 343 Discontinued 1982; Specification for 2-Ethoxyethyl Acetate (95% Grade)

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D 345-97 Test Method for Sampling and Testing Calcium Chloride for Roads and Structural Applications, 04.03

D 346-90(1998) Practice for Collection and Preparation of Coke Samples for Laboratory Analysis, 05.05

D 347-97 Tables for Volume and Specific Gravity Correction for Creosote, Creosote-Coal Tar Solutions, and Coal Tar, 04.10

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D 349-92(1997) Test Methods for Laminated Round Rods Used for Electrical Insulation, 10.01

D 350-96 Test Methods for Flexible Treated Sleeving Used for Electrical Insulation, 10.01

D 351-97 Classification for Natural Muscovite Block Mica and Thins Based on Visual Quality, 10.01

D 352-97 Test Methods for Pasted Mica Used in Electrical Insulation, 10.01

D 353 Discontinued 1995; Specification for Natural Rubber Insulation for Wire and Cable, 60°C Operation

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D 356 Discontinued 1935; Method of Tension Testing of Natural Building Stone and Sample for Testing

D 357 Discontinued 1970; Method of Test for Knock Characteristics of Motor Fuels Below 100 Octane Number by the Motor Method; Replaced by D 2700

D 358-98 Specification for Wood to Be Used as Panels in Weathering Tests of Coatings, 06.02

D 359 Discontinued 1940; Specification for Shellac Varnish; Replaced by D 360

D 360-89(1996)<sup>1</sup> Specification for Shellac Varnishes, 06.03

D 361 Discontinued 1968; Specification for Industrial 90 Benzene

D 362 Discontinued 1991; Specification for Industrial Grade Toluene

D 363-90(1995) Specification for Tricresyl Phosphate, 06.04

D 364 Discontinued 1982; Specification for Industrial Grade Xylene

D 365-84(1996)<sup>1</sup> Test Methods for Soluble Nitrocellulose Base Solutions, 06.02

D 366 Discontinued 1938; Specification for Concrete for Pavements

D 367-94 Test Method for Xylene-Insoluble Matter in Creosote, 04.10

D 368-89(1995)<sup>1</sup> Test Method for Specific Gravity of Creosote and Oil-Type Preservatives, 04.10

D 369-84(1995)<sup>1</sup> Test Method for Specific Gravity of Creosote Fractions and Residues, 04.10

D 370-84(1995)<sup>1</sup> Test Method for Dehydration of Oil-Type Preservatives, 04.10

D 371-89(1996) Specification for Asphalt Roll Roofing (Organic Felt) Surfaced with Mineral Granules; Wide Selvage, 04.04

D 372-90(1995)<sup>1</sup> Specification for Flexible Treated Sleeving Used for Electrical Insulation, 10.01

D 373 Discontinued 1994; Specification for Black and Yellow Straight-Cut and Bias-Cut Varnished Cotton Cloth and Tape for Electrical Insulation

D 374-94 Test Methods for Thickness of Solid Electrical Insulation, 10.01

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D 376 Discontinued 1976; Methods of Test for Holland Cloth

D 377 Discontinued 1976; Methods of Test for Small Amounts of Copper and Manganese in Textiles

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D 379 Discontinued 1938; Methods of Test for rubber hose; Replaced by D 380

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D 383 Discontinued 1940; Specification for Titanium Calcium Pigment; Replaced by D 476

D 384 Discontinued 1939; Specification for Titanium Dioxide; Replaced by D 476

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D 392 Discontinued 1963; Methods of Testing Molding Powders Used in Manufacturing Molded Electrical Insulators

D 393 Discontinued 1938; Specification for Insulated Wire and Cable: Class A, 30% Heavy Rubber Compound

D 394 Discontinued 1970; Method of Test for Abrasion Resistance of Rubber Compounds

D 395-98 Test Methods for Rubber Property—Compression Set, 09.01

D 396-98 Specification for Fuel Oils, 05.01

D 397 Discontinued 1951; Specification for Emulsified Asphalt; Replaced by D 977

D 398 Discontinued 1950; Specification for Emulsified Asphalt; Replaced by D 977

D 399 Discontinued 1950; Specification for Emulsified Asphalt; Replaced by D 977

D 400 Discontinued 1937; Specification for Emulsified Asphalt (Heavy Premix-Winter Grade)

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D 403 Discontinued 1953; Methods of Testing and Tolerances for Yarns Containing Wool; Replaced by D 1285

D 404 Discontinued 1953; Methods of Testing and Tolerances for Yarns Containing Wool; Replaced by D 1285

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D 406 Discontinued 1961; Method of Test for Relative Dry Hiding Power of White Pigments in Linseed Oil Vehicle

D 407 Discontinued 1977; Definitions of Terms Relating to Gross Calorific Value and Net Calorific Value of Solid and Liquid Fuels; Replaced by D 121

D 408 Discontinued 1951; Method of Test for Grindability of Coal by the Ball-Mill Method

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D 413-98 Test Methods for Rubber Property—Adhesion to Flexible Substrate, 09.01

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D 1148-95 Test Method for Rubber Deterioration—Heat and Ultraviolet Light Discoloration of Light-Colored Surfaces, 09.01

D 1149-91(1997) Test Method for Rubber Deterioration—Surface Ozone Cracking in a Chamber, 09.01

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D 1154 Discontinued 1957; Method of Test for Purity of Acetone and Methyl Ethyl Ketone

D 1155-89(1994)\*<sup>1</sup> Test Method for Roundness of Glass Spheres, 06.02

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D 1164 Discontinued 1985; Test Method for Ring Crush of Paperboard; Replaced by TAPPI T 818

D 1165-80(1994)\*<sup>1</sup> Nomenclature of Domestic Hardwoods and Softwoods, 04.10

D 1166-84(1995)\*<sup>1</sup> Test Method for Methoxyl Groups in Wood and Related Materials, 04.10

D 1167 Discontinued 1972; Methods of Testing Asphalt-Base Emulsions for Use As Protective Coatings for Built-Up Roofs; Replaced by D 2939

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D 1199-86(1991)\*<sup>1</sup> Specification for Calcium Carbonate Pigments, 06.03

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D 1204-94 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheet or Film at Elevated Temperature, 08.01

D 1205 Discontinued 1974; Methods of Testing Adhesives for Brake Lining and Other Friction Materials

D 1206 Discontinued 1981; Method of Test for Resistance to Aging of Vulcanized Rubber by Measurement of Creep

D 1207 Discontinued 1972; Recommended Practice for Classifying Elastomeric Compounds for Resilient Automotive Mountings

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D 1214-89(1994)\*<sup>1</sup> Test Method for Sieve Analysis of Glass Spheres, 06.02

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| <b>REPRODUCTION FOR USE OF BLIND OR PHYSICALLY HANDICAPPED INDIVIDUALS</b> A signature on this form at space 10, and a check in one of the boxes here in space 8, constitutes a non-exclusive grant of permission to the Library of Congress to reproduce and distribute solely for the blind and physically handicapped and under the conditions and limitations prescribed by the regulations of the Copyright Office: (1) copies of the work identified in space 1 of this application in Braille (or similar tactile symbols); or (2) phonorecords embodying a fixation of a reading of that work; or (3) both.<br>a <input checked="" type="checkbox"/> Copies and Phonorecords b <input type="checkbox"/> Copies Only c <input type="checkbox"/> Phonorecords Only <span style="float: right; font-size: 2em;">9</span>   |   |
| <b>DEPOSIT ACCOUNT</b> If the registration fee is to be charged to a Deposit Account established in the Copyright Office, give name and number of Account.<br>Name <u>American Society for Testing and Materials</u> Account Number <u># DA078328</u>   |   |
| <b>CORRESPONDENCE</b> Give name and address to which correspondence about this application should be sent. Name/Address/Apt./City/State/Zip<br><u>Robert L. Meltzer, ASTM</u><br><u>100 Barr Harbor Drive</u><br><u>West Conshohocken, PA 19428-2959</u><br>Area Code & Telephone Number <u>610-832-9632</u> <span style="float: right; font-size: 2em;">10</span>  |   |
| <b>CERTIFICATION</b> I, the undersigned, hereby certify that I am the<br>Check one <input type="checkbox"/> author<br><input type="checkbox"/> other copyright claimant<br><input type="checkbox"/> owner of exclusive right(s)<br><input checked="" type="checkbox"/> authorized agent of <u>American Society for Testing and Materials</u><br>of the work identified in this application and that the statements made by me in this application are correct to the best of my knowledge. Name of author or other copyright claimant, or owner of exclusive right(s)<br>Typed or printed name and date <u>Robert L. Meltzer</u> If this application gives a date of publication in space 3, do not sign and submit it before that date. date <u>2/26/99</u>  |   |
| <div style="display: flex; align-items: center;"><div style="flex: 1;"><br/>Handwritten signature (X)<br/><u>Robert L. Meltzer</u></div><div style="flex: 1; border: 1px solid black; padding: 5px;"><b>MAIL CERTIFICATE TO</b><br/>Name <u>Kathe Hooper, ASTM</u><br/>Number Street Apartment Number <u>100 Barr Harbor Drive</u><br/>City State ZIP <u>West Conshohocken, PA 19428-2959</u></div><div style="flex: 1; padding: 5px;"><b>YOU MUST</b><br/>• Complete all necessary spaces<br/>• Sign your application in space 10<br/><b>SEND ALL ELEMENTS TO THE SAME PLACE</b><br/>1. Application form<br/>2. Nonrefundable \$20 filing fee in check or money order payable to Register of Copyrights<br/>3. Deposit material<br/><b>MAIL TO</b><br/>Register of Copyrights<br/>Library of Congress<br/>Washington, D.C. 20559</div></div> <div style="float: right; font-size: 2em; margin-top: -100px;">11</div> <div style="clear: both;"></div> <div style="font-size: 0.8em; margin-top: 10px;"><p>Copyright fees are adjusted at 5-year intervals, based on increases or decreases in the Consumer Price Index. The next adjustment is due in 1995. Contact the Copyright Office in January 1995 for the new fee schedule.</p><p>* 17 U.S.C. § 506(e). Any person who knowingly makes a false representation of a material fact in the application for copyright registration provided for by section 409 or in any written statement filed in connection with the application shall be fined not more than \$2,500.</p><p>June 1992—50,000</p><p style="text-align: right;">U.S. GOVERNMENT PRINTING OFFICE 1992—312-432/60,002</p></div> |   |

# EXHIBIT 5

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# **Form and Style for ASTM Standards**

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**January 2015**

**JA197**

## **FORM AND STYLE FOR ASTM STANDARDS**

**Form of ASTM Test Methods**

**Form of ASTM Specifications**

**Form of Other Types of ASTM Standards**

**Use of the Modified Decimal Numbering System**

**Terminology in ASTM Standards**

**Caveats and Other Legal Aspects in Standards—Special Instructions**

**Standards Style Manual**

**Use of SI Units in ASTM Standards**

**Annex A**



**ASTM INTERNATIONAL  
100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959**

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## PREFACE

ASTM International (hereafter referred to as ASTM International or ASTM), founded in 1898, is a scientific and technical organization formed for “the development of standards on characteristics and performance of materials, products, systems, and services; and the promotion of related knowledge.” It is the world’s largest source of voluntary consensus standards.

The purpose of this manual is to promote uniformity of form and style in ASTM standards. Such uniformity is desirable because it helps the user to find what is needed more easily and to understand what is read more quickly. Such uniformity in a manuscript is necessary if it is to be published by ASTM International. Deviations from ASTM style may mean wasted time on the part of authors, reviewers, editors, and eventually the reader of the standard. This means costly time and resources are lost by everyone involved.

Section 10.7 of the [\*Regulations Governing ASTM Technical Committees\*](#) requires that the current edition of this manual be followed in the writing of standards. When conditions preclude compliance with this manual, a committee may request an exemption from the Committee on Standards (COS).

Responsibility for the *Form and Style for ASTM Standards* is vested in the Board of Directors. Revisions to this manual may be recommended by the Board of Directors, by the Committee on Standards, or by a technical committee or its Executive Subcommittee. The Committee on Standards acts upon recommendations for changes and reviews all requests from technical committees for exceptions to the *Form and Style for ASTM Standards*. Recommended changes to this manual in *technical* substance and format shall be referred to the Committee on Standards, which, at a regular meeting, shall rule on the merits of the recommendation. A circular letter ballot will be issued to the technical committees and the responses will be addressed by COS. The COS recommendation shall be sent to the Board of Directors. Changes adopted by the Board of Directors shall be announced to the members and shall become effective on the date determined by the Board of Directors.

Suggestions for *editorial* revision of this manual should be addressed to the Staff Coordinator—Form and Style Manual, ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959.

## INTRODUCTION

This manual is the basic textbook for anyone writing an ASTM standard. A study of Parts A, B, C, or E will show the proper form for the principal types of standards including a detailed explanation of how to write each section, from the title to the appendixes. Within Parts A, B, C, and E, the first section lists the preferred sequence of headings and indicates whether these sections are mandatory. The headings identified as “mandatory” are required. Other headings shall be included when the subject matter is pertinent to the document under development, in which case, all instructions and guidance for that particular section shall be followed. For example, if the standard does not contain reference to any standard documents within the text, it is not required to include a section on Referenced Documents. If, however, specific hazards are cited throughout the text, then the section on Hazards shall be followed. Included at appropriate places are examples and standard wording. Also included are examples of correctly written complete manuscripts of various types of standards. Where standards are referenced throughout the text of this manual, visit the ASTM website, [www.astm.org](http://www.astm.org), and refer to the standard’s Document Summary page.

For easy reference purposes, each paragraph in an ASTM standard shall be numbered. The modified decimal numbering system adopted is explained in Part D. Part E gives instructions for preparing standard definitions and a format for specialized terminology standards. Special instruction concerning patents, use of trademarks, open-end agreements, fire standards, and other legal issues are given in Part F.

Part G is a detailed Style Manual that includes among other things information on abbreviations, spellings, literature references, and preparation of illustrations.

ASTM policy is that SI units be included in all standards. Part H is included to aid the standards writer to incorporate these units correctly. It is the technical committee’s decision whether SI or other units are the preferred unit of measurement used in the committee’s document. When SI and non-SI units of measurement are contained in a document, the order in which they appear is determined by that committee.

For additional information about ASTM procedures, or available publications such as the [\*Regulations Governing ASTM Technical Committees\*](#) and [\*Officer Handbook\*](#), contact ASTM Technical Committee Operations, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959 (Telephone: 610-832-9673).

## DEFINITION

The following definitions apply to the use of the content of this manual and clarify which sections or formats, or both, are mandatory when presenting ASTM documents:

1. “Shall” is used to indicate that a provision is mandatory.
2. “Should” is used to indicate that a provision is not mandatory but is recommended as good practice.
3. “May” is used to indicate that a provision is optional.
4. “Will” is used to express futurity, but never to indicate any degree of requirement.

Definitions for *standard*, *classification*, *guide*, *practice*, *specification*, *terminology*, and *test method* are quoted below from the current [Regulations Governing ASTM Technical Committees](#):

**standard**, *n*— *as used in ASTM International*, a document that has been developed and established within the consensus principles of the Society and that meets the approval requirements of ASTM procedures and regulations.

**DISCUSSION**—The term “standard” serves in ASTM International as a nominative adjective in the title of documents, such as test methods or specifications, to connote specified consensus and approval. The various types of standard documents are based on the needs and usages as prescribed by the technical committees of the Society.

**classification**, *n*— a systematic arrangement or division of materials, products, systems, or services into groups based on similar characteristics such as origin, composition, properties, or use.

**guide**, *n*— a compendium of information or series of options that does not recommend a specific course of action.

**DISCUSSION**—A guide increases the awareness of information and approaches in a given subject area.

**practice**, *n*— a definitive set of instructions for performing one or more specific operations that does not produce a test result.

**DISCUSSION**—Examples of practices include, but are not limited to: application, assessment, cleaning, collection, decontamination, inspection, installation, preparation, sampling, screening, and training.

**specification**, *n*— an explicit set of requirements to be satisfied by a material, product, system, or service.

**DISCUSSION**—Examples of specifications include, but are not limited to, requirements for; physical, mechanical, or chemical properties, and safety, quality, or performance criteria. A specification identifies the test methods for determining whether each of the requirements is satisfied.

**terminology standard**, *n*— a document comprising definitions of terms; explanations of symbols, abbreviations, or acronyms.

**test method**, *n*— a definitive procedure that produces a test result.

**DISCUSSION**—Examples of test methods include, but are not limited to: identification, measurement, and evaluation of one or more qualities, characteristics, or properties. A precision and bias statement shall be reported at the end of a test method. (Refer to Section A21 on Precision and Bias.)

**approval date**, *n*— the date assigned by ASTM International through the Committee on Standards, which indicates that a new standard, revision or reapproval has successfully completed the balloting and appeals process in accordance with the [Regulations Governing ASTM Technical Committees](#).

**publication date**, *n*— the month/year that an approved standard is made publicly available in either electronic or hardcopy form.

## PART A

# FORM OF ASTM TEST METHODS

## INTRODUCTION

An ASTM test method, as defined on p. vii, typically includes a concise description of an orderly procedure for determining a property or constituent of a material, an assembly of materials, or a product. The directions for performing the test should include all of the essential details as to apparatus, test specimen, procedure, and calculations needed to achieve satisfactory precision and bias.

An ASTM test method should represent a consensus as to the best currently available test procedure for the use intended. It should be supported by experience and adequate data obtained from cooperative tests.

In order to be the “best currently available,” test methods need periodic review to determine whether revisions are desirable as the result of technological advances in manufacturing, testing, and use requirements.

ASTM test methods are frequently intended for use in the buying and selling of materials according to specifications and therefore should provide such precision that when the test is properly performed by a competent operator the results will be found satisfactory for judging the compliance of the material with the specification. These test methods cover the determination of fundamental properties of materials such as density, absolute viscosity, softening point, and flash point. They may include a variety of different laboratory procedures such as chemical and spectrochemical analyses, mechanical and electrical tests, weathering tests, visual examination, fire tests, performance characteristics, sampling, nondestructive tests, and radiation exposure tests. In some standards, optional test methods are included.

Statements addressing precision and bias are required in ASTM test methods. This gives the user of the test method an idea of the nature of the sample to be prepared and analyzed and information regarding the nature of the data obtained by using the method. The requirement of precision and bias statements does not mean that numerical statements are required. It means that the spread of resulting data and its relationship to an accepted reference material or source (if available) shall be addressed. Some test methods have no numerical expression of precision or bias (for example, pass/fail tests, spot tests.) In these cases, precision and bias shall be addressed and the reasons for not including relevant data explained. Test methods are sometimes prepared for use in research rather than in the buying and selling of materials. Other test methods cover process control, screening, and field tests. Although these latter test methods may not always be as precise as referee test methods, they are sufficiently precise for the intended use and usually require less time. Field tests allow testing at the site, thus eliminating transportation of specimens to and from the laboratory.

Special instructions with respect to the legal aspects are included in Part F and shall be followed in writing any standard. These include such matters as contractual items, caveat statements, patents, and fire standards. Assistance on the development of fire standards is available from Committee E05. The policies contained in Part F are approved by and are under the jurisdiction of the ASTM Board of Directors.

When a standard is being developed, the costs associated with its development and subsequent use generally should be considered. The prime objective should be the optimum use of resources to achieve satisfactory definition of the product or service. However, it should be noted that when the standard relates to the safety of persons, cost considerations are likely to become much less important than when attributes of materials or products are involved. Some standards, such as definitions, impose no cost on the user; others that include numerous and extensive requirements can entail significant expense to users of the standard. The requirements to be included should, therefore, be those that are technically relevant and yield benefits commensurate with the cost of their determination.

Cost effectiveness statements or rationale may be included within a standard if appropriate, usually in an appendix.

## A1. Subject Headings of Text

A1.1 The following is the sequence for the text of ASTM test methods. Headings are those most generally used but may not be all-inclusive. It may be necessary to include other headings for specialized subjects. The headings identified as “mandatory” are required. Other headings shall be included when the subject matter is pertinent to the document under development, in which case, all instructions and guidance for that particular section shall be followed. For example, if the standard does not contain reference to any standard documents within the text, it is not required to include a section on Referenced Documents. If, however, specific hazards are cited throughout the text, then the section on Hazards shall be followed.

|   |  |
|---|--|
|   | Title (mandatory)                        |
| † | Designation (mandatory)                  |
| † | Introduction                             |
|   | Scope (mandatory)                        |
| † | Referenced Documents                     |
| † | Terminology                              |
|   | Summary of Test Method                   |
|   | Significance and Use (mandatory)         |
|   | Interferences                            |
|   | Apparatus                                |
|   | Reagents and Materials                   |
|   | Hazards (mandatory when applicable)      |
|   | Sampling, Test Specimens, and Test Units |
|   | Preparation of Apparatus                 |
|   | Calibration and Standardization          |
|   | Conditioning                             |
|   | Procedure (mandatory)                    |
|   | Calculation or Interpretation of Results |
|   | Report                                   |
|   | Precision and Bias (mandatory)           |
|   | Measurement Uncertainty                  |
| † | Keywords (mandatory)                     |
| † | Annexes and Appendixes                   |
| † | References                               |
|   | Summary of Changes                       |

† The headings marked with a dagger (†) should appear only once in test methods that contain two or more test methods.

A1.2 Not all of these headings may be required for a particular standard. Additional headings that are included to cover specialized subjects should appear in the most appropriate place, depending on their relation to the sections listed in A1.1. When a standard includes several

test methods, repetition of appropriate headings may be desirable.

A1.3 Subject headings in boldface type shall precede each section to orient the reader. Text divisions shall be subdivided in accordance with the Use of the Modified Decimal Numbering System guide in Part D of this publication.

A1.4 For convenience in application and when economy in printing may result, test methods may include a series of procedures for determining the same or different properties of a given material. In such test methods, include at the beginning of the standard individual sections describing those features that are common to all of the separate test methods. Identify different methods within the standard by capital letters, starting with A; i.e., Test Method A, Test Method B, etc.

A1.5 Examples of test methods for single determination:

B331 Test Method for Compressibility of Metal Powders in Uniaxial Compaction  
C693 Test Method for Density of Glass by Buoyancy

A1.6 Examples of test methods covering a series of test methods:

D1179 Test Methods for Fluoride Ion in Water  
D2137 Test Methods for Rubber Property—Brittleness  
Point of Flexible Polymers and Coated Fabrics  
F38 Test Methods for Creep Relaxation of a Gasket Material

A1.7 In deciding whether to describe similar test methods as portions of a single standard or as separate test methods, the following criterion may be found useful: When the descriptions of the apparatus and procedure are similar and a significant economy in printing can be accomplished by combining, and if, because of clearly understood distinctions in applicability, no confusion can rise as to which test method should be used, then it is desirable to treat the test methods as parts of a single standard. If confusion could arise, the test methods should be published separately. If one test method is preferred as a referee method, it should be so designated, in which case

the other test methods should be designated as optional or nonreferee. When test methods are published separately, a worthwhile saving can be accomplished by making cross-references from one test method to another for the apparatus and detailed description of the procedure.

## A2. Title (Mandatory)

A2.1 The title should be concise but complete enough to identify the nature of the test, the material to which it is applicable, and to distinguish it from other similar titles. Titles of analogous standards should be identical, except for the distinctive feature(s) of each standard. Titles are used frequently in lists, tables of contents, indexes, tabulating card systems, etc., and therefore should be brief but inclusive. Select words that easily lend themselves to indexing. The essential features of a title are the particular property or constituent being determined, the material to which the test method is applicable, and when pertinent, the technique or instrumentation. If the test method is designated to determine a number of constituents or properties, use a general title, omitting the names of specific constituents or properties. When a standard includes a number of individual test methods for different constituents or properties, the title need indicate only the general nature of the tests and the material to which it is applicable.

## A3. Designation and Year Date

A3.1 *Designation (mandatory)*— The ASTM designation, assigned by Headquarters on submittal for approval, consists of the following sequential parts:

A3.1.1 A letter designation denoting in general the classification according to material, product, system or service.

- A—Ferrous metals and products
- B—Nonferrous metals and products
- C—Cementitious, ceramic, concrete, and masonry materials
- D—Miscellaneous materials and products
- E—Miscellaneous subjects
- F—End-use materials and products
- G—Corrosion, deterioration, weathering, durability, and degradation of materials and products

A3.1.2 A sequential number following the letter designation (for example, Specification C150).

A3.2 *Year Date:* (for example, Specification C150-01).

A3.2.1 After the designation, a hyphen is followed by the last two numbers of the year of acceptance or of last revision. If the standard is revised again during the same year, this is indicated by adding an “a” for the second revision, “b” for the third revision, etc.

A3.2.2 The parenthetical phrase “(Reapproved 20\_\_\_\_)” to designate the year of last preapproval of a standard, if applicable.

A3.2.3 For editorial changes that do not change the year designation, a note is inserted before the text to indicate the location and date of the change and a superscript epsilon (ε) is added after the year designation. The epsilon designations and corresponding notes are numbered chronologically and are deleted upon occasion of the next revision or reapproval.

A3.3 The designation numbers of standards that have been discontinued are not reassigned.

A3.4 *SI Standards* (see Part H and Section G24.)

## A4. Introduction

A4.1 A separate section covering general introductory or informational material is not generally used in ASTM test methods. Occasionally, a test method is of such a nature that it requires an explanatory statement for proper understanding by the user. In such instances an introduction should be included immediately after the title of the test method but without a section number.

A4.2 Examples of test methods that include introductions are as follows:

D143 Test Methods for Small Clear Specimens of Timber  
D905 Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading

## A5. Scope (Mandatory)

A5.1 Include in this section information relating to the purpose of the test method. State if the method is quantitative or qualitative, and any known limitations. Concisely state the property or constituent that is being determined and the

materials that can be analyzed. State the range of concentrations/values determined.

A5.2 Include, where applicable, the analytical technique, for example, gas chromatography, and whether the test is performed in the laboratory, field, or on-line.

A5.3 Include in this section the system of units to be used in referee decisions.

A5.4 Include in this section any caveats required by ASTM policy such as the caveats on *safety hazards* (see F2.1) and *fire hazards* (see F2.2).

A5.5 For standards developed for reference in model (building) codes, include the following statement:

The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

## A6. Referenced Documents

A6.1 List in alphanumeric sequence the designation and complete title of the following documents referenced within the standard; ASTM standards and adjuncts; and standards and codes of other organizations. For references to all other documents, including ASTM STPs, use the format indicated in Section G21.

A6.2 Provide footnotes to this section to indicate the sources of these documents. When ASTM standards are referenced later in the text, use only the type of standard (that is, specification, test method, practice, classification, guide, terminology, etc.) and the designation letter and number (for example, Test Method D1310).

A6.3 Do not include the year date when designating referenced documents unless there is a technical reason for requiring a particular revision.

A6.4 When listing referenced adjuncts, provide a brief description in this section, and a footnote of the availability. (For more specific information on adjuncts, refer to Section A28).

## A7. Terminology

A7.1 Every standard should include a section on terminology.

A7.1.1 All significant terms that may have a meaning more specialized than the commonly

used language should be defined within a standard or the terminology standard should be referenced. (See Part E on Terminology.)

A7.1.2 To avoid redundant definitions, check the committee terminology standard, terminology sections within committee technical standards, and the *ASTM Online Dictionary of Engineering Science and Technology*.

A7.2 *Terminology Within a Standard*— This section may include paragraphs on definitions, definitions of terms specific to a standard, symbols, abbreviations, acronyms, discussions, or a combination thereof.

A7.2.1 *Definitions*— Write a definition in the dictionary-definition form and assign a section number, term, part of speech, definition, and, when applicable, a delimiting phrase. Italicize the term, part of speech, and delimiting phrase. Do not capitalize the term or any other components of the definition except for proper nouns, acronyms, or any other words capitalized in normal usage (see Section E4). List the terms in alphabetical order. Example follows:

3. Terminology—(Always use as the main heading.)

3.1 *Definitions*:

3.1.1 *color blindness, n*—total or partial inability to differentiate certain hues.

3.1.2 *transmittance, n*—of light, that fraction of the incident light of a given wavelength which is not reflected or absorbed, but passes through a substance.

A7.2.2 *Discussions*— When more detail of the concept being defined is desirable, supplementary information should be added as a separate numbered paragraph labeled “Discussion” immediately following the definition. Use the term “Discussion” instead of “Note” (see E5.8). Example follows:

3.1.2.1 *Discussion*—Extraneous leakage is the sum of all leakage other than that intended to be measured by the test.

E283

A7.2.3 *Definition(s) of Term(s) Specific to This Standard*— This is a term that is specific to the standard in which it is used and that has no application out of that context. Write a definition of term specific to a standard in the dictionary-definition form and include a section number,

term, part of speech, definition, and, when applicable, a delimiting phrase. Italicize the term, part of speech, and delimiting phrase. Do not capitalize the term or any other components of the definition except for proper nouns, acronyms, or other words capitalized in normal usage (see Section E4). List the terms in alphabetical order. Example follows:

3.1 *Definition of Terms Specific to This Standard:*

3.1.1 *batch sampling, n*—sampling over some time period in such a way as to produce a single test sample for analysis.

**D4175**

**A7.2.4 Symbols**— In a standard with numerous equations containing identical quantity symbols, symbols may be listed alphabetically and unnumbered in this section instead of under each equation; also italicize the symbol and do not capitalize the definition. (See also Section E6.) Example follows:

3.1 *Symbols:*

A = cross-sectional area of specimen

B = normal induction

**A7.2.5 Referencing Terminology Standard**— If the terminology applicable to the standard is included in a terminology standard, cite the applicable terminology standard. Example follows:

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method, refer to Terminology D1129.

## **A8. Summary of Test Method**

**A8.1** Include here a brief outline of the test method, describing in the passive voice its essential features without the details that are a necessary part of the complete statement of procedure. If desired, a brief statement of the principle of the test method may be given; this is particularly desirable in the case of chemical methods and should appear as the first paragraph. In chemical methods state the type of procedure, such as colorimetric, electrometric, and volumetric, and describe the source of color, major chemical reaction including pertinent chemical equations, etc.

## **A9. Significance and Use (Mandatory)**

**A9.1** Include in this section information that explains the relevance and meaning of the test. State the practical uses for the test and how it is typically employed. Avoid repetition of information included in the Scope (see Section A5). Include statements to provide the user with comprehensive understanding of the following:

**A9.1.1** The meaning of the test as related to the manufacture and end use of the material,

**A9.1.2** The suitability of the test for specification acceptance, design purposes, service evaluation, regulatory statutes, manufacturing control, development and research, and

**A9.1.3** The fundamental assumptions inherent in the test method that may affect the usefulness of the results.

**A9.2** Include any discretion needed in the interpretation of the results of the test.

**A9.3** Include, where applicable, comparisons of the test to other similar procedures.

## **A10. Interferences**

**A10.1** If the successful application of the test method requires the inclusion of explanatory statements on interference effects, include such information here; otherwise, omit this section. List briefly the constituents or properties that are likely to cause interference and the amounts that are known to interfere. In some cases this information is obtainable only by observation during the performance of the test. If the presence of an interfering factor affects the precision or bias of the test results and compensations are made in the calculations (Section A19), this should be explained in this section and noted in the appropriate section. In some cases, interferences may be a major factor in judging test results and explanations of their effects may become lengthy. Lengthy explanations may be placed in an annex to the standard.

## **A11. Apparatus**

**A11.1** In this section, include a brief description of the essential features of the apparatus and equipment required for the test, and, where they clarify or supplement the text, schematic drawings or photographs. Cover in separate

text divisions the important features and requirements for the apparatus. Do not list common laboratory apparatus, such as flasks and beakers, but include any especially modified forms or unusual sizes of common apparatus that are required or that may require special preparation.

A11.2 Trademarks shall not be used unless a specific manufacturer's product is required for a well-defined reason (see Section F3 for regulations regarding patents in ASTM standards). In such cases an explanatory footnote shall be included giving supplementary information regarding such apparatus or material. The footnote shall state that this apparatus or material "has been found satisfactory for this purpose." When special types of glassware are required, such as heat-resistant and chemical-resistant, state the significant characteristic desired rather than a trademark. For example, use "borosilicate glass" rather than "Pyrex" or "Kimax." Specify filter paper by describing the significant characteristic such as porosity, rate of filtering, and ash content, or by reference to ASTM Specification E832, for Laboratory Filter Papers

NOTE A1—Policies have been adopted by the Board of Directors that are applicable to standards involving patented apparatus, materials, and processes. These policies are described in the [Regulations Governing ASTM Technical Committees](#). Before submitting to subcommittee or main committee ballot any draft test method that requires a specific manufacturer's product, consult the Staff Manager of your committee as to necessary conformance with the [Regulations Governing ASTM Technical Committees](#).

A11.3 Detailed manufacturing requirements for apparatus, unless quite brief, should preferably be placed in an annex to the test method (see A24.3), retaining in the text only a brief outline with schematic drawings or illustrations where necessary. The purpose of this outline is to provide information regarding the essential features of the apparatus, to enable the user to assemble the equipment and understand its use in the test method.

A11.4 When essentially the same apparatus is used for more than one standard and the description of the apparatus requirements is lengthy, it is recommended that the complete specifications for the apparatus be included in an annex to one standard and merely a reference be

made to them in the other standard, mentioning under "Apparatus" only such modifications as may apply in each particular case.

A11.5 When the same apparatus is used in several standards, the detailed specifications should be covered by a separate ASTM standard. Examples of such standards are:

E1 Specification for ASTM Thermometers  
E133 Specification for Distillation Equipment

A11.6 It is the responsibility of the sponsoring committee to assure itself that suitable apparatus is available (see Section F4).

A11.6.1 If the apparatus is special or not readily available, detailed rules for referencing sources of supply shall be followed (see Section F4).

A11.6.2 If the apparatus has to be built, blueprints, plans, etc., should be cited in a footnote in this section as available through ASTM International Headquarters as adjunct material to the standard.

## A12. Reagents and Materials

A12.1 When more than one procedure is included in one standard, list the reagents and materials required for each procedure as a separate section under each subdivision.

A12.2 It is recommended that, where applicable, the following be included as secondary sections ".1" and ".2" of this section:

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available.<sup>1</sup> Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water as defined by Type \_\_\_\_ of Specification D1193.

NOTE A2—The identifying number (for example 6.1 and 6.2 as above) used in recommended texts are for illustrative purposes.

<sup>1</sup> *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

A12.2.1 If a different grade of water is required, add a second sentence as follows: “Water conforming to the following specifications is required” (list the specific properties, kinds of ion freedom, etc.)

A12.2.2 In standards covering two or more chemical methods these statements on purity should be made in a separate section entitled “Purity of Reagents.”

A12.3 List the reagents alphabetically in separate divisions. Give the name of the reagent first, followed by any descriptive terms (see A12.7). State the desired concentration if significant; then follow with instructions for preparation and standardization (if required), using the imperative mood and concise descriptions. Spell out the full name of the reagent, and immediately after the first mention of the name include within parentheses the exact chemical formula of the reagent showing any water of crystallization, etc. Exception to this may be made in the case of organic, organometallic, or complex inorganic compounds by omitting the chemical formula. Subsequent references to compounds shall be by formula only where they can be clearly specified by this means, as in the case of most inorganic compounds. As exceptions, always spell out the word “water” and the names of substances in their elementary state; for example, use lead, not Pb; oxygen, not O<sub>2</sub>. If the reagent is to be used as purchased, and not diluted, dissolved, or purified, state the chemical formula as given by the manufacturer.

A12.4 Do not use trademarks unless a specific manufacturer’s product is required for a well-defined reason. (See Section F4.) In this case, use a superior reference number to refer to a footnote giving the required information, incorporating the phrase “has been found satisfactory for this purpose.” Where particular reagents are required only for standardization or calibration, identify them by reference to an appropriate

footnote such as “This reagent is used for standardization purposes only.”

A12.5 Specify the reagent concentration in applicable terms, as follows:

Concentrated acids and bases ... density, unless mass percent is more generally used or required

Dilute acids and bases ... volume ratio, X + Y (X volumes of reagent added to Y volumes of water)

Nonstandardized solutions ... grams of reagent as weighed out per litre of solution

Standardized solutions ... normality, expressed decimally; or the equivalent of 1 mL of solution in terms of grams of a given element expressed as “1 mL + xxx g of ...”

A12.6 Wherever possible, use the same concentrations of reagents and methods of standardization as used in other similar ASTM test methods.

A12.7 Examples of reagent descriptions are as follows:

A12.7.1 *Ammonium Carbonate* (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>).

A12.7.2 *Sodium Chloride Solution* (100 g/L)—Dissolve 100 g of sodium chloride (NaCl) in water and dilute to 1 L.

A12.7.3 *Potassium Hydroxide, Methanol Solution* (33 g/L)—Dissolve 33 g of potassium hydroxide (KOH) in methanol and dilute to 1 L with methanol.

A12.7.4 *Barium Chloride Solution* (100 g BaCl<sub>2</sub>/L)—Dissolve 117.3 g of barium chloride dihydrate (BaCl<sub>2</sub> · 2H<sub>2</sub>O) in water and dilute to 1 L.

### A13. Hazards

A13.1 *Safety Hazards*— Paragraph F2.1 specifies the generic safety hazards caveat and the types of standards in which it shall be used. Other statements on safety are subject to the following policies.

A13.1.1 *Warning Statement*— A warning statement identifies a specific hazard and provides information for avoiding or minimizing a particular hazard. When there are hazards to personnel, such as explosion, fire toxicity, or radiation, or technical hazards, such as damage to equipment, a warning statement shall be placed at the appropriate point in the text beginning with “Warning” in boldface type followed by a

description of the hazard, or a reference to a description of the hazard within the body of the standard (refer to A13.1.2).

A13.1.2 *Remedial Statements*— A remedial statement provides recommendations for treating a situation resulting from an unsuccessfully controlled hazard *associated with the use of a standard*. Such remedial statements shall not be included in standards, but reference may be made in a note to authoritative sources where reliable information about remedial measures can be obtained such as the appropriate Material Safety Data Sheet (MSDS) where applicable.

#### **A14. Sampling, Test Specimens, and Test Units**

A14.1 Under this heading give necessary special directions, in the imperative mood, for physically obtaining sample test units. If a test result is defined as a combination of the observations made on different test specimens, particularly describe how these specimens are to be selected. Give necessary special directions for storage of specimens, for preservation of specimens, and for special preparation of specimens for the test.

A14.2 Statistical aspects of sampling for a specific purpose, for example, in determining conformance of the mean properties of a lot to specifications, should be referenced or discussed in an appendix. These statistical aspects might include stratification, selection of primary and secondary sampling units, the number of such units to be selected, in the case of bulk material the number of increments combined to form a composite sample, the number of composites to be formed, the method of subsampling a composite, and the number of tests made on a subsample.

A14.3 If the method of sampling is described in an existing ASTM test method or ASTM specification, refer to that test method or specification by designation.

A14.4 If the method of sampling is detailed in a readily available publication other than an existing ASTM standard, refer to the publication in a footnote, arranging the information in accordance with the suggestions presented in the Standards Style Manual, Part G, of this publication.

A14.5 Where an existing sampling method (other than ASTM) is cited in a test method, guidelines should be given as to the use of the sampling scheme and precautions if needed. If explanatory documents regarding sampling are available, these should be cited in this section.

A14.6 A *test unit* is a unit or portion of a material that is sufficient to obtain a test result(s) for the property or properties to be measured. A *test specimen* is a test unit or portion of a test unit upon which a single or multiple observation is to be made. A *test result* refers to the value obtained for a given property from one test unit. A test unit may be a subunit of a primary (first stage) sampling unit or it may be a subunit of a composite of primary sampling units or of increments from these primary sampling units. A test result may be a single observation or a combination of a number of observations when two or more test specimens are measured for each test unit. (For additional information see Section G23.)

A14.7 The size of the test unit for chemical analysis usually is given in the “Procedure” section, but if significant in connection with pretreatment or preparation, it should be included here. When a test specimen is specified by mass, indicate the degree of precision desired.

A14.8 Include detailed requirements as to the size and number of test specimens to be used for both physical and chemical tests. Where a test specimen or test unit of a particular shape is required, the essential dimensions shall be specified, including tolerance. A drawing showing the details of the specimen or test unit may be included.

#### **A15. Preparation of Apparatus**

A15.1 Use this section only when detailed instructions are required for the initial assembly, conditioning, or preparation of the apparatus (see also A24.3.6).

#### **A16. Calibration and Standardization**

A16.1 *Apparatus*— Give detailed instructions, in the imperative mood, for calibration and adjustment of the apparatus necessary for the use of the test method.

**A16.2 Reference Standards and Blanks—** Give detailed instructions for the standardization and use of reference standards and blanks used in the test method. Describe any standard samples used to assure uniformity of the test technique, and standard specimens or photographic standards.

**A16.3 Calibration Curves and Tables—** Give detailed instructions for the preparation and use of calibration curves or tables, in accordance with the suggestions presented in the Standards Style Manual, Part G, of this publication. Include in the instructions for curve or table preparation items such as calibration, solutions, reference standards, blanks, color development, photometry, and construction.

## **A17. Conditioning**

**A17.1** Specify, in the imperative mood, the conditioning atmosphere to be used and the time of exposure to the atmosphere, as well as the atmosphere required during the test, where necessary. State whether the conditioning requirements apply to laboratory samples as well as individual specimens. Indicate any requirements for preconditioning. Where applicable, refer to ASTM Terminology E41, Terms Relating to Conditioning, and to ASTM Practice E171/E171M, for Conditioning and Testing Flexible Barrier Packaging.

## **A18. Procedure (Mandatory)**

**A18.1** Include in proper sequence detailed directions for performing the test. Describe the procedure in the imperative mood, present tense; for example: "Heat the test specimen ..." rather than "The test specimen shall be heated ..." State the number of samples to be taken, and also state the number of specimens to be tested from each sample. Describe in detail the successive steps of the procedure, grouping related operations into logical divisions. Subheadings may be used if they will help the organization of the material. Make the text of the procedure concise, to the point, and easily understandable. When alternative procedures are given, state their relative status; that is, which is the preferred or referee procedure.

**A18.2** In chemical methods, specify the size of test specimen and indicate the degree of precision desired in the weighing. Consider the specimen size and its accuracy of weighing in connection with the ultimate use of the method. If the formula for a reagent has been given previously in accordance with the instructions given in A12.3, refer to the reagent by chemical formula only or name, whichever is less confusing. Otherwise, spell out the name of the reagent. The procedure shall provide for any operations necessary to obtain any correction data that may be needed.

## **A19. Calculation or Interpretation of Results**

**A19.1 Calculation—** State the directions in the imperative mood for calculating the results of test including any equations and any required significant figures (see also Section G16 and ASTM Practice E29 for Using Significant Digits in Test Data to Determine Conformance with Specifications.) Spell out names in the text but use letter symbols in the equations to designate individual values. Use numerical values for any constants. Describe the letter symbol immediately under the equation (unless a section on symbols is included; see A7.2.4). Avoid the use of combined factors in chemical methods. Indicate the reference point on which the calculations are based, such as on the sample as received and dry basis, and the units in which the results are reported. If necessary for clarity, a typical calculation should be included in an explanatory note.

**A19.1.1** An example of a typical equation is:

$$\text{Aluminum, \%} = \frac{(A \times B) \times 0.0587}{C} \times 100$$

where:

*A* = grams of aluminum oxyquinolate found in the aliquot used,

*B* = grams of aluminum oxyquinolate found in the blank, and

*C* = grams of sample represented in the aliquot used.

**A19.2 Interpretation of Results—** Use this heading in place of "Calculation" when the results of the test are expressed in descriptive form, relative terms, or abstract values. List and

define the descriptive terms or classifications used. The results of a test may be interpreted or expressed in terms of a rating scale. There is fairly wide agreement on five-step scales for many values or rankings of merit, with 5-good, 3-middle, 1-bad. In general, a higher score for more of a desirable property is the more satisfactory arrangement. This eliminates confusion arising from No. 1 in rank for the most of a quantity, without regard to the relative desirability.

A19.2.1 Examples of test methods that include rating systems are:

D130 Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test

D3511/D3511M Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Brush Pilling Tester Method

## **A20. Report**

A20.1 State in this section the detailed information required in reporting the results of the test. When two or more procedures are described in a test method, the report shall indicate which procedure was used. When the test method permits variation in operating or other conditions, incorporate in the report a statement as to the particular conditions used in the test. As an aid in the calculation and uniform recording of test results a standard report form or work sheet may be used, and if desirable a facsimile of the form may be included in the test method. Introduce the section as follows: "Report the following information:"

## **A21. Precision and Bias (Mandatory)**

A21.1 *Definitions and Additional Information:*

A21.1.1 For precise definitions of statistical terms, refer to ASTM Terminology E456, Relating to Quality and Statistics.

A21.1.2 For more information on calculation methods relating to the use of statistical procedures, refer to ASTM Practices E177 and E691.

A21.2 *Statement of Precision (Mandatory):*

A21.2.1 Precision is the closeness of agreement between test results obtained under prescribed conditions. A statement on precision

allows potential users of the test method to assess in general terms its usefulness in proposed applications. A statement on precision is not intended to contain values that can be duplicated in every user's laboratory. Instead the statement provides guidelines as to the kind of variability that can be expected between test results when the test method is used in one or more reasonably competent laboratories.

A21.2.2 Precision shall be estimated in accordance with the interlaboratory test program prescribed in Practice E691, Conducting an Interlaboratory Study to Determine the Precision of a Test Method, or by an interlaboratory test program that yields equivalent information, for example, a standard practice developed by an ASTM technical committee. The data and details of the interlaboratory study to determine precision shall be filed as a research report at ASTM International Headquarters. The precision statement shall include reference to the research report in a Note.

A21.2.3 Every test method shall contain: (1) a statement regarding the precision of test results obtained in the same laboratory under specifically defined conditions of within-laboratory variability (repeatability conditions); and (2) a statement regarding the precision of test results obtained in different laboratories (reproducibility conditions).

A21.2.4 The repeatability conditions defined in Terminology E456 shall be used; namely, within-laboratory conditions under which test results are obtained with the same test method in the same laboratory by the same operator with the same equipment in the shortest practicable period of time using test specimens taken at random from a single quantity of homogeneous material. If some other within-laboratory variability is also determined (such as for longer times or different operators within a laboratory), the particular conditions shall be reported in detail, and the precision designated "intermediate precision" (see Terminology E456). If the committee formerly called this repeatability, add "(formerly called repeatability)."

A21.2.5 The statement regarding between-laboratory variability shall pertain to test results obtained with the same method on random test

units from the same lot of homogeneous material in different laboratories with different operators using different equipment (reproducibility conditions).

A21.2.6 The precision statement shall include the repeatability standard deviation and reproducibility standard deviation; and shall include the 95 % repeatability limit and the 95 % reproducibility limit for the largest expected differences between two test results. The latter are numerically equal to 2.8 times the respective standard deviation for data that are known to be normally distributed, and approximately so for most other data encountered in ASTM committee work. Use a statement such as the following:

*Precision*<sup>1</sup>—The repeatability standard deviation has been determined to be (insert repeatability value) and the 95 % repeatability limit is (insert value). The reproducibility standard deviation has been determined to be (insert reproducibility value) and the 95 % reproducibility limit (insert value).

<sup>1</sup>Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: (insert report number). Contact ASTM Customer Service at service@astm.org.

### A21.3 *Statement on Bias (Mandatory):*

A21.3.1 Bias is a systematic error that contributes to the difference between the mean of a large number of test results and an accepted reference value. A discussion on bias may be found in statistical documents, such as Practices E177 and C670.

A21.3.2 The bias statement shall describe the bias and methods employed to provide corrected test results. If the bias is not known but the direction or bounds on the bias, or both, can be estimated, these shall be reported in the bias statement.

### A21.4 *General Considerations:*

A21.4.1 The precision and bias section of the test method shall include a brief descriptive summary of the interlaboratory study that will permit the user of the test method to judge the reliability of the data. This summary should include number of laboratories, number of property levels tested, range of the measured average property levels, and number of replicate tests. The summary may be included in a Note.

A21.4.2 If precision or bias, or both, varies with the test level, the variation shall be described in the statement.

A21.4.3 When revising or reapproving a test method, ensure that the information reported in the Precision and Bias section and the supporting data are still valid. If there has been a change to the test method that could affect precision, a new interlaboratory study should be conducted.

### A21.5 *Exceptions:*

A21.5.1 If the responsible committee decides that an interlaboratory study for a new test method should be delayed, a temporary statement shall be included which addresses only repeatability based on the results from a single operator. A repeatability limit is not included. This temporary precision statement is permitted for five years, use a statement such as the following:

*Precision*<sup>1</sup>—The repeatability standard deviation from a single operator has been determined to be (insert repeatability value or values for different average property values).

<sup>1</sup>An interlaboratory study of this test method is being conducted and a complete precision statement is expected to be available on or before (insert year).

A21.5.2 If it is not feasible to determine the reproducibility, as directed in A21.2, within five years of the first approval of the standard, use a statement such as the following:

*Precision*<sup>1</sup>—The repeatability standard deviation from a single operator has been determined to be (insert the average test values and corresponding repeatability values).

<sup>1</sup>The reproducibility of this test method is not provided at this time because (insert here the reason or reasons). The reproducibility of this test method is being determined and is expected to be available on or before (insert year).

A21.5.3 When a test method specifies that the procedure in another ASTM test method is to be used without modification, no statements of precision and bias are necessary if those in the other test method are applicable. When a test method specifies that the procedure in another ASTM test method is to be used with only insignificant modification(s), use a statement

such as the following to assure the reader that precision and bias are not affected by the modification(s):

*Precision and Bias*—The precision and bias of this test method for measuring (insert here the name of the property) are essentially as specified in Test Method (insert here the designation of the other test method).

When a test method specifies that the procedure in another ASTM test method is to be used with significant revisions, provide statements on precision and bias as directed in A21.2 and A21.3.

A21.5.4 When a test method specifies that a test result is a nonnumerical report of success or failure or other categorization or classification based on criteria specified in the procedure, use a statement on precision and bias such as the following:

*Precision and Bias*—No information is presented about either the precision or bias of Test Method X0000 for measuring (insert here the name of the property) since the test result is nonquantitative.

A21.5.5 If it is not possible to provide a statement on precision (repeatability or reproducibility) as directed in A21.2, use a statement such as the following:

*Precision*—It is not possible to specify the precision of the procedure in Test Method X0000 for measuring (insert here the name of the property) because (insert here the reason or reasons).

Citing impracticability is not warranted if the reason is that an interlaboratory study has revealed that the precision is poor or that the standard was written before precision statements were required.

A21.5.6 If bias cannot be determined, a statement to this effect shall be included, such as the following:

*Bias*—No information can be presented on the bias of the procedure in Test Method X0000 for measuring (insert here the name of the property) because (insert here the reason; such as “no material having an accepted reference value is available”).

## A22. Measurement Uncertainty

A22.1 Measurement uncertainty is an estimate of the magnitude of systematic and random measurement errors that may be reported along with the measurement result. An uncertainty statement relates to a particular result obtained in a laboratory carrying out the test method, as opposed to precision and bias statements which are mandatory parts of the method itself and normally derived from an interlaboratory study conducted during development of the test method.

A22.2 It is neither appropriate for, nor the responsibility of, the test method to provide explicit values that a user would quote as their estimate of uncertainty. Uncertainty values must be based on data generated by a laboratory reporting results using the test method.

A22.3 In this section include guidance for developing estimates of uncertainty to be reported with test results. Suggestions should be considered for studies to perform, listings of the potential major contributing factors to uncertainty, descriptions of how the variation due to each factor might be evaluated, and examples of how they might be combined. Information of this type is particularly useful to users of the test method seeking laboratory accreditation. Information on measurement uncertainty may be placed in an appendix if it is for information only.

A22.4 For additional guidance refer to Guide E1488.

## A23. Keywords (Mandatory)

A23.1 In this section, identify the words, terms, or phrases, that best represent the technical information presented in the standard. Select the keywords from the title and body of the document and include general, vernacular, and trade terms. These keywords will be used in the preparation of the ASTM Subject Index.

A23.2 Select three or more keywords that describe the names of tests, procedures, special materials, or the specific application(s) that will facilitate the identification and retrieval of the standard.

A23.3 All selected keywords shall be stand-alone terms; the type of standard, incomplete phrases, unattached adjectives, etc., shall not be used.

## **A24. Annexes and Appendixes**

A24.1 Additional information may be included in one or more annexes and appendixes to the test method.

A24.2 The words “Mandatory Information” shall be included directly under the title of annexes and the words “Nonmandatory Information” shall be included directly under the title of appendixes.

A24.3 *Annexes*— Include in annexes any detailed information such as that on apparatus or materials that is a mandatory part of the test method but too lengthy for inclusion in the main text. Annexes shall precede appendixes. Examples of such information are as follows:

A24.3.1 Glossary of terms used in the method,

A24.3.2 List of symbols,

A24.3.3 Detailed description of apparatus,

A24.3.4 Instructions for calibrating and standardizing apparatus,

A24.3.5 Directions for cleaning apparatus, and

A24.3.6 Operating instructions and adjustments of specific makes of apparatus.

A24.4 *Appendixes*— An appendix to an ASTM standard is informative only and is not a mandatory part of the standard. Information on the following general subjects has been included in such appendixes:

A24.4.1 Notes on significance and interpretation of the test method, usually to amplify the statement in the text,

A24.4.2 Development of equations used in the calculations,

A24.4.3 Charts or supplementary information for computations,

A24.4.4 Suggested data forms for recording test results, and

A24.4.5 Commentary on rationale used in the development of the test method.

## **A25. References**

A25.1 Include only references to publications supporting or providing needed supplementary information. Historical and acknowledgment references are not desirable. If there are five or more references, list them in an unnumbered section at the end of the standard in the order in which they appear in the text. If there are fewer than five literature references, use footnotes (see Section G21).

## **A26. Footnotes**

A26.1 *General*— Footnotes referenced in the text are intended only for reference and shall never include any information or instructions necessary for the proper application of the method. Table footnotes are a part of the table. Use consecutive superior numerals for reference to footnotes except in connection with tables, in which case use italic capital letters.

A26.2 *Committee Jurisdiction and History*— Footnote 1 shall include in the first paragraph the committee having jurisdiction and, where the committee so requests, the subcommittee. The second paragraph shall include history information as follows: (1) approval date of latest revision, (2) month and year of publication, (3) designation and year of original issue, (4) designation and year of previous issue, and (5) information as to any other standards that may have been replaced by the standard, year of redesignation, etc.

A26.3 *Literature References*— Use footnotes for references if there are fewer than five. For five or more see Section A25, observing the limitations noted therein. Also see Section G21.

A26.4 *Sources of Apparatus*— Where apparatus may be special or not readily available from more than one source, the source may be referenced. (However, see Section F4 for detailed rules.)

A26.5 *Research Reports*— Reference in a footnote the availability of Research Reports (see Section A29).

## **A27. Notes**

A27.1 Notes in the text shall not include mandatory requirements. Notes are intended to

set explanatory material apart from the text itself, either for emphasis or for offering informative suggestions, which are not properly part of the standard. Clarification of the description of required apparatus or procedure and modifications required or permitted in certain cases belong in the text itself. If inclusion of the contents yields a different result, then that information is considered mandatory for the performance of the standard and shall be located in the text. Notes may be preferable for detailed description of auxiliary procedures (for example, correction of barometric pressure in a test method not primarily concerned with pressure). Table notes are a part of the table and are mandatory provisions.

A27.2 Notes appearing in a given standard shall be numbered in sequence separately in the main text, separately in sequence in the annex, and separately in sequence in the appendix and should appear at the end of the paragraph to which they pertain. If it is desired to refer to a text note in connection with a specific word or phrase in the text, that word or phrase should be followed by a reference to the note, “(NOTE 1),” etc.

A27.3 Notes in the text are preferred for the following:

A27.3.1 To refer to editorial changes made in the text,

A27.3.2 To refer to similar or companion ASTM standards,

A27.3.3 Limitations of the application of the test when not covered in the text.

A27.3.4 Description, if included under “Scope,” of experimental means for recognizing cases where the method is not applicable to the material under test.

A27.3.5 Description of additional (not alternative) apparatus, materials, procedures, or calculations that are not actually required; or description of merely recommended forms of construction of required apparatus.

A27.3.6 Explanation, if desired, of the reasons for a certain requirement or direction. If brief, include in the text rather than as a note.

A27.4 *Patent Disclaimer of Liability*— See Section 15 of the [Regulations Governing ASTM Technical Committees](#). This note, quoted in F3.2

and not numbered, is generally placed at the end of the standard. Refer questions regarding the applicability of this section to the Staff Manager of your committee.

A27.5 *General Statement of ASTM Policy*—

This note, quoted in F2.3 and not numbered, is generally placed at the end of the standards after the note on Patent Disclaimer of Liability.

## A28. Adjuncts

A28.1 Occasionally, it is not practicable to publish as an integral part of the standard, because of its nature, material that may be required for use of the standard. Such material is published as an adjunct.

A28.2 Include a description of the adjunct in the text of the standard. If appropriate, include a figure (illustration) of the adjunct.

A28.3 When adjunct material is indicated, it shall be made available at the time of publication of the standard.

A28.4 Include all referenced adjuncts in the Referenced Documents section (see Section A6).

A28.5 Examples of adjuncts are as follows:

A28.5.1 Comparison standards such as the copper strip corrosion standards for Test Method D130 (lithograph aluminum strips),

A28.5.2 Charts such as the viscosity-temperature charts for liquid petroleum for D341,

A28.5.3 Reference radiographs such as E155 or reference photographs, such as E125,

A28.5.4 Technical data such as the twelve volumes of D1250, Petroleum Measurement Tables, and

A28.5.5 Drawings such as detailed drawings for the construction of the smoke chamber in Test Method D2843.

## A29. Research Reports (Mandatory for Precision and Bias Statements Producing Numerical Results)

A29.1 Where numerical data have been generated to establish the precision and bias of a test method, a research report is required. The research report shall include a list of participating laboratories, description of samples, a copy of the laboratory instructions, the equipment/apparatus

used, the data, a statistical summary and a copy of the Precision and Bias Statement, where applicable. A guide for the research report is available at [www.astm.org](http://www.astm.org) or from ASTM International Headquarters. The research report shall be placed on file at ASTM. A number is assigned by ASTM and a copy may be obtained upon request. A footnote shall be placed in the standard stating that a copy of the research report may be obtained from ASTM, giving the "RR" designation number.

### A30. Rationale

A30.1 The inclusion of a rationale (commentary) section in ASTM standards is encouraged to ensure that brief and concise documentation is available to the user of the standard and to provide traceability and clarification of past actions. This documentation may include: (1) a brief history of the development of a new standard or revision to an existing standard including when and why the effort was initiated, (2) reasons and justification for requirements, (3) documentation of factors considered, and (4) listing of technical sources and literature.

A30.2 If included, this information shall appear in an appendix of the standard.

A30.3 Examples of standards that include section on rationale:

E84 Test Method for Surface Burning Characteristics of Building Materials

F746 Test Method for Pitting or Crevice Corrosion of Metallic Surgical Implant Materials

### A31. Summary of Changes

A31.1 If the committee chooses to provide a Summary of Changes, place this unnumbered

section at the end of the standard and begin with the following introductory paragraph:

Committee XXX has identified the location of selected changes to this standard since the last issue (insert designation and year date ) that may impact the use of this standard.

A31.2 An asterisk will appear after the Scope (**Scope\***) with the following wording at the bottom of the first page:

**\*A Summary of Changes section appears at the end of this standard.**

A31.3 Next list, by section or subsection, changes made since the last issue that may impact the use of the standard. For standards that have undergone multiple revisions in a short period of time, keep the Summary of Changes in the standard for 18 months. This will ensure that all changes from one publication of the Annual Book of ASTM Standards to the next are recorded. Brief descriptions of the changes and reasons for the changes may be included. If desired, a more extensive description of reasons for the changes should be placed in the appendix.

A31.4 An example of the list of changes is:

- (1) Deleted Section 5 and renumbered subsequent sections.
- (2) Updated precision statement in Section 10 to reflect the results of a recent interlaboratory study.
- (3) Revised hardness requirements in Table 2.
- (4) Revised Section 14 on Product Marking.

## PART B

### FORM OF ASTM SPECIFICATIONS

#### INTRODUCTION

The broad scope of ASTM International, which covers materials, products, systems, and services, and the need to provide for a variety of approaches to the writing of ASTM specifications, prevent the development of a single document or a series of documents that list all subjects to be covered in all ASTM specifications. This document, however, is intended to provide considerable guidance to the committees in their specification-writing activities.

Special instructions with respect to the legal aspects shall be followed in writing any standard. These include such matters as contractual items, caveat statements, patents, and fire standards. Assistance on development of fire standards is available from Committee E05. See Part F for details.

When a standard is being developed, the costs associated with its development and subsequent use generally should be considered. The prime objective should be the optimum use of resources to achieve satisfactory definition of the product or service. However, it should be noted that when the standard relates to the safety of persons, cost considerations are likely to become much less important than when attributes of materials or products are involved. Some standards, such as definitions, impose no cost on the user; others that include numerous and extensive requirements can entail significant expense to users of the standard. The requirements to be included should, therefore, be those that are technically relevant and yield benefits commensurate with the cost of their determination.

Cost effective statements or rationale may be included within a standard if appropriate, usually in an appendix.

Standards or sections of standards relating to the *safe use or performance* of consumer products (see NOTE B1) may be sent to Committee F15 on Consumer Products for review and comment at some appropriate stage prior to letter ballot of the originating main committee. This review is offered by Committee F15 to provide for the maximum of consumer input. Draft standards submitted to Committee F15 will receive rapid and constructive critique.

NOTE B1—Consumer products are those designed primarily for use by the consumer in and around the home, school, or recreational areas.

#### B1. Functions

B1.1 Specifications (see definition on p. vii) may have three functions and, although many specifications serve all three, it is well that those drafting specifications keep these functions in mind so that the primary purposes are not confused.

B1.1.1 *Purchasing*— Specifications facilitate dealings between the purchaser and the supplier. Sufficient requirements should be included to ensure that all batches, lots, or deliveries from any seller that conform to the specification will be satisfactory to the purchaser. Unnecessary requirements are likely to increase costs and should be avoided.

B1.1.2 *Standardization*— Standardization is an inevitable byproduct of most specifications. In some cases it may be the primary function. Standardization involves a deliberate and possibly arbitrary choice of a limited number from the multiplicity of qualities, sizes, compositions, etc., that may be available.

B1.1.3 *Providing Technical Data*— All specifications contain technical information, but in some cases the designer requires more information than that provided for purchase or standardization. Committees may add information of this type to specifications either as requirements or as appendixes.

B1.2 *Open-End Agreements*— There shall be no statements in specifications that allow

agreement between purchaser and supplier that do not meet the minimum requirements of the specification by such means as omitting tests that are a part of the specification, substituting or modifying a test method, or by changing the specification limits to be less restrictive.

## B2. Subject Headings of Text

B2.1 The following is the sequence for the text of ASTM specifications. Headings are those most generally used, but may not be all-inclusive. It may be necessary to include other headings for specialized subjects. The headings identified as “mandatory” are required. Other headings shall be included when the subject matter is pertinent to the document under development, in which case, all instructions and guidance for that particular section shall be followed. For example, if the standard does not contain reference to any standard documents within the text, it is not required to include a section on Referenced Documents. If, however, specific hazards are cited throughout the text, then the section on Hazards shall be followed. Not all of these headings may be required for a particular standard. Additional headings, which are included to cover specialized subjects, should appear in the most appropriate place and sequence depending on their relation to the sections below.

Title (mandatory)  
 Designation (mandatory)  
 Scope (mandatory)  
 Referenced Documents  
 Terminology  
 Classification  
 Ordering Information  
 Materials and Manufacture  
 Chemical Composition  
 Physical Properties  
 Mechanical Properties  
 Performance Requirements  
 Other Requirements  
 Dimensions, Mass, and Permissible Variations  
 Workmanship, Finish, and Appearance  
 Sampling  
 Number of Tests and Retests  
 Specimen Preparation  
 Test Methods  
 Inspection  
 Rejection and Rehearing  
 Certification  
 Product Marking  
 Packaging and Package Marking  
 Keywords (mandatory)

Supplementary Requirements  
 Quality Assurance  
 Annexes and Appendixes  
 References  
 Summary of Changes

† Test methods included shall contain the mandatory headings shown in Section A1, except for title and designation.

B2.2 Subject headings in boldface type shall precede each section to orient the reader. Substitute text divisions and number in accordance with the Use of the Modified Decimal Numbering System guide in Part D of this publication.

## B3. Title (Mandatory)

B3.1 The title should be as concise as possible, but complete enough to identify the material, product, system, or service covered by the specification. Titles are used in lists, table of contents, and indexes, and it is most important that they be brief but inclusive. Use the singular form: “specification.”

## B4. Designation and Year Date

B4.1 Designation (mandatory)—The ASTM designation, assigned by Headquarters on submittal for approval, consists of the following sequential parts:

B4.1.1 A letter designation denoting in general the classification according to material, product, system, or service:

A—Ferrous metals and products  
 B—Nonferrous metals and products  
 C—Cementitious, ceramic, concrete, and masonry materials  
 D—Miscellaneous materials and products  
 E—Miscellaneous subjects  
 F—End-use materials and products  
 G—Corrosion, deterioration, weathering, durability, and degradation of materials and products

B4.1.2 A sequential number following the letter designation (for example, Specification C150).

B4.2 *Year Date*: (for example, Specification C150-01):

B4.2.1 After the designation, a hyphen is followed by the last two numbers of the year of acceptance or of last revision. If the standard is revised again during the same year, this is indicated by adding an “a” for the second revision, “b” for the third revision, etc.

B4.2.2 The parenthetical phrase (“Reapproved 20\_\_\_\_”) to designate the year of last reapproval of a standard, if applicable.

B4.2.3 For editorial changes that do not change the year designation, a note is inserted before the text to indicate the location and date of the change and a superscript epsilon (°) is added after the year designation. the epsilon designations and corresponding notes are numbered chronologically and are deleted upon occasion of the next revision or reapproval.

B4.3 Designation numbers of standards that have been discontinued are not reassigned.

B4.4 *SI Standards* (see Part H and Section G24).

## **B5. Scope (Mandatory)**

B5.1 Include in this section information relating to the purpose of the specification. Concisely state the materials, products, systems, or services to which the specification applies and any known limitations. Include, where applicable, the intended use of the specification. Do not include references to trademarks.

B5.2 Include in this section the system of units to be used in referee decisions.

B5.3 Include in this section any caveats required by ASTM policy such as *safety hazards* (see F2.1) and *fire hazards* (see F2.2) if one or more test methods are detailed other than by reference.

B5.4 For standards developed for reference in model (building) codes, include the following statement:

The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

## **B6. Referenced Documents**

B6.1 List in alphanumeric sequence the designation and complete title all documents referenced within the standard. Refer to Section A6 for further information.

B6.2 Provide footnotes to this section to indicate the sources of these documents. When ASTM standards are referenced later in the text, use only the type of standard (that is, specifica-

tion, test method, practice, classification, guide, terminology, etc.) and the designation letter and number (for example, Test Method D1310).

B6.3 Do not include the year date when designating referenced documents unless there is a technical reason for requiring a particular revision.

B6.4 When listing referenced adjuncts, provide a brief description in this section, and a footnote of the availability. (For more specific information on adjuncts, refer to Section B29).

## **B7. Terminology**

B7.1 See Section A7.

## **B8. Classification**

B8.1 When more than one material, product, or system is specified, they may be separated first by *types*, which are distinguished by Roman numerals. This first subdivision shall be based upon some major property, composition, or application of the item. Designate further subdivision by *grades* according to some pertinent property or properties and identify by Arabic numbers. If necessary, make additional division into *classes*, identified by capital letters.

B8.2 The precedence of type, grade, and class, as well as the method of designation, is the ASTM preferred style, and it shall be used in the absence of any established preference.

B8.3 When a type, grade, or class has been deleted, do not use this designation again, to avoid confusion with earlier specifications. If new designations are used, they shall be of different format and preferably followed (for a limited time) by the previous designation in parentheses.

## **B9. Ordering Information (See also Section B25)**

B9.1 When the specification covers options for purchase, such as various types, grades, classes, alloys, sizes, and mass, the purchase order or inquiry should state which particular types, alloys, sizes are desired.

B9.2 A listing of each such optional feature, together with a reference to the applicable section of the specification, will be of assistance in the

wording of orders. After the attention of the purchaser is directed to all of the options in the specification, his attention might be directed to what would be furnished by the supplier if the purchaser fails to specify one or more of the options.

B9.3 It is recommended that this section be included in all specifications as a checklist of items to be included in a purchase order or contract. If this list contains any ASTM designation (including referenced documents), it is desirable to specify “year date(s)” to avoid misunderstandings between contractual parties.

B9.4 When citing a combined standard, indicate the system of units to be applied. For example:

X.X This material/product shall conform to the requirements stated in SI units of Specification A36/A36M.

## **B10. Materials and Manufacture**

B10.1 General requirements regarding the materials and method of manufacture to be used may be included when deemed helpful to the user of the standard, such as the open-hearth, electric-furnace, or basic-oxygen bessemer processes generally specified for steel products. When the material, product, or system specified is made from two or more materials or products, this section should state briefly the general requirements of the materials or products to be used and the process to be followed in manufacture, including items such as the nature and character of any alloys, fillers, saturants, antioxidants, coatings, and plasticizers.

## **B11. Chemical Composition**

B11.1 When necessary, detailed requirements shall be given as to chemical composition and other chemical characteristics for the material, product, or system. Frequently these are presented in tabular form. It is most important that the following information be clearly indicated: (1) name of each constituent specified, (2) whether the requirement is a maximum, minimum, or range, (3) whether an allowance for measurement error is incorporated in these limits, (4) the units applicable, (5) references to notes or footnotes when necessary for further clarification, and (6) appropriate analytical methodology.

B11.2 The sequence of items specified shall be consistent within a related group of specifications.

B11.3 The preferred introduction for this section is: “The material shall conform to the requirements prescribed in Table 1.”

B11.4 *Limits on Nonspecified Elements*— It is suggested that the following statement be added to tables of chemical requirements as applicable to replace the requirements and statements presently being used regarding nonspecified elements: “By agreement between purchaser and supplier, analysis may be required and limits established for elements or compounds not specified in the table of chemical composition” (see also Section B24).

## **B12. Other Requirements**

B12.1 When necessary, detailed requirements should be given as to characteristics to which the material, product, or system shall conform. Frequently these are presented in tabular form. It is most important that the following information be clearly indicated: (1) name of each property or requirements, (2) whether the requirement is a maximum, minimum, or range, (3) whether an allowance for measurement error is incorporated in these limits, (4) the units applicable, (5) references to notes or footnotes when necessary for further clarification, and (6) appropriate test methodology.

B12.2 *Physical Properties*— Present the requirements for electrical, thermal, optical, and similar properties in this section, usually in tabular form.

B12.3 *Mechanical Properties*— Present the requirements for tensile strength, yield strength, elongation, and similar properties in this section.

B12.4 *Performance Requirements*— Include functional, environmental, and similar requirements in this section when necessary.

B12.5 *Other Requirements*— Include additional requirements as needed.

B12.6 In preparing a specification it is essential to make sure that there is a test procedure for determining conformance for each requirement. These shall be listed in the specification (see Section B18).

B12.7 When it is not feasible to tabular the requirements, separate text division may be used to specify the various requirements. These shall be given appropriate headings consistent with the subject matter included.

### **B13. Dimensions, Mass, and Permissible Variations**

B13.1 Details as to the standard shapes, mass, and size ranges usually are presented best in tabular form with brief reference in the text. Separate sections may be necessary with individual tables. The tables shall clearly indicate where the various size ranges are divided; for example, ranges from 0 to 250 mm, 250 to 500 mm, 500 to 750 mm shall be more properly stated as 250 mm and under, over 250 to 500 mm, inclusive; over 500 to 750 mm, inclusive, etc.

B13.2 The permissible variations in dimensions, mass, etc., may be included in the same tables with the nominal sizes. It shall be made clear whether the tolerances specified are both plus and minus or apply in only one direction.

### **B14. Workmanship, Finish, and Appearance**

B14.1 Requirements covering the workmanship and finish include such general requirements as the type of finish and general appearance or color, uniform quality and tempers (for metals), and whether the item is clean, sound, free of scale and injurious defects. To avoid misunderstanding, these should be spelled out clearly. Provisions for removal or repair of minor surface imperfections that are not considered cause for rejection should be stated.

B14.2 For products such as pipe and tile it is usually customary to specify absence of defects such as fractures, large or deep cracks, checks, blisters, laminations, and surface roughness. The finish and shape of the ends also should be specified.

### **B15. Sampling**

B15.1 If a specification applies to a unit of product or material such as a piece of cloth, a coil of wire, a section of plastic pipe, or a heat of steel, from which specimens are to be taken for testing, the procedure for obtaining these specimens shall be described.

B15.2 If a specification pertains to individual units of a lot and sampling inspection is likely to be the normal procedure, it is desirable for the specification to reference or include in a supplementary section a sampling procedure for determining acceptability of the lot (see Section B25).

NOTE B2—In a single sampling plan by attributes the acceptability of a lot will be determined by the number of units of product in the sample that do not conform to the specifications. The acceptable quality level (AQL) and limiting quality level (LQL) of an acceptance sampling plan, expressed as percentages of the units nonconforming, are characteristics of the sampling plan and are not to be viewed as product specifications.

B15.3 If a specification pertains to the mean of a lot, in particular to the mean of a lot of bulk material such as cement or pig iron, the procedure for sampling the lot or the formation of sample test units, or both, shall be described or referenced. The criterion for determining conformance of the lot shall be specifically stated.

B15.4 If a specification applies to a lot of bulk material, state the number of increments required to create a sample test unit and the number of test units to be taken to determine conformance of the lot.

B15.5 The minimum amount of material required to carry out conveniently all the tests in the specification should be indicated for the convenience of the user of the specification.

### **B16. Number of Tests and Retests**

B16.1 State the number of test units and the number of test specimens or subunits that are required to determine conformance of the material or product to the specifications. In the sampling of a lot of bulk material, state the size of the sample in terms of the number of primary (first stage) sampling units that is required to determine conformance to the specifications.

NOTE B3—When a specification pertains to several different properties of a material to be determined by a variety of test methods, a test unit is defined as a unit or portion of the material that is sufficient to obtain a single, adequate set of test results for all properties to be measured.

B16.2 If a specification allows retesting in cases where the material or product fails to pass

the specification, state the rules for the retesting and the conditions under which the retesting would be permitted.

### **B17. Specimen Preparation**

B17.1 Where special preparation is required, as for example in specifications for molding materials, this section shall be included.

B17.2 Refer to a standard test method if possible.

B17.3 If no standard test method exists, include sufficient detail in the specification to assure acceptable reproducibility of test results.

B17.4 State that specimens are to be prepared in accordance with the recommendations of the manufacturer only if neither B17.2 nor B17.3 is feasible.

### **B18. Test Methods**

B18.1 List standard test methods for measurement of all requirements of a specification. Refer to the ASTM test methods used in testing the material to determine conformance with the specification. This includes sampling, chemical analysis, mechanical, electrical, thermal, optical, and other testing procedures. When alternative procedures are given in test methods, it is important to state which particular procedure shall be used as the basis for the specification requirement.

B18.2 When there is no ASTM test method specified for a particular quality or property of a specified material, describe the test procedure to be followed in detail in the specification, following the Form of ASTM Test Methods (Part A of this publication). Include all mandatory information listed in A1.1 (title, scope, significance and use, hazards, procedure, precision and bias).

B18.3 Where a method of some other organization is being used and the committee has not approved the test as an ASTM test method, then it is preferable to describe the test in detail in the specification and to include a footnote reference to the original source. Appropriate copyright releases shall be obtained.

B18.4 State all procedures in the imperative mood.

### **B19. Inspection**

B19.1 The following statement has been adopted by the Board of Directors to be used when there is a substantial disagreement between producers and users within a particular committee, resulting in a blockage of progress in the acceptance of new specifications or revisions to specifications:

Inspection of the material shall be agreed upon between the purchaser and the supplier as part of the purchase order or contract.

B19.2 Place any technical requirements on inspection such as sampling plan and physical or mechanical properties in other appropriate parts of the specification.

### **B20. Rejection and Rehearing**

B20.1 The following statement serves as a guide to ASTM committees when there is need for a section on rejection and rehearing:

Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

### **B21. Certification**

B21.1 A certification section may be included in the standard when in the judgment of the committee, technical considerations make this advisable. If a certification section is included, the certification shall include reference to the standard designation and year date.

B21.2 The following are suggested statements:

When specified in the purchase order or contract, the purchaser shall be furnished certification stating samples representing each lot have been tested and inspected as indicated in this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished. Test reports may be transmitted to the purchaser by electronic services. The content of the electronically transmitted document shall conform to any existing agreement between the purchaser and the seller.

B21.3 Upon the request of the purchaser in the purchase order or contract, the certification of an independent third party indicating conformance to the requirements of this specification may be considered.

**B22. Product Marking**

B22.1 It is customary to specify the information to be marked on the material or included on the package, or on a label or tag attached thereto. Such information typically may include the name, brand, or trademark of the manufacturer, quantity, size, weight, ASTM designation, or any other information that may be desired for a specific material. If an ASTM standard is specified, indicate “ASTM” and the designation number (for example, ASTM F2063) on the marking, when possible.

**B23. Packaging and Package Marking**

B23.1 When it is customary and desirable to package, box, crate, wrap, or otherwise protect the item during shipment and storage in accordance with a standard practice, it is customary to state the requirements.

**B24. Keywords (Mandatory)**

B24.1 In this section, identify the words, terms, or phrases that best represent the technical information presented in the standard. Select the keywords from the title and body of the document and include general, vernacular, and trade terms. These keywords will be used in the preparation of the ASTM Subject Index.

B24.2 Select three or more keywords that describe the names of tests, procedures, special materials, or the specific application(s) that will facilitate the identification and retrieval of the standard.

B24.3 All selected keywords shall be standalone terms; the type of standard, incomplete phrases, unattached adjectives, etc., shall not be used.

**B25. Supplementary Requirements**

B25.1 For some standards supplementary requirements may be specified. These should not include statements that would allow the lowering of minimum requirements of the standard (see B1.2). Usually these apply only when specified by the purchaser in the purchase order or contract. A statement to this effect shall appear in the

first paragraph of the Supplementary Requirements section. The following is a suggested statement relating to special requirements:

The following supplementary requirements shall apply only when specified by the purchaser in the purchase order or contract.

B25.2 Supplementary requirements shall appear separately in a Supplementary Requirements section.

B25.3 *Quality Assurance*— This requirement, if included, shall be qualified by the statement: “When specified in the purchase order or contract.” Reference to a suitable document, such as ASTM International, ANSI, MIL, etc., may be made by agreement between the supplier and the purchaser.

**B25.4 Qualification:**

B25.4.1 Qualification to nongovernment standards shall be based on the same justification and operated under the same rules as qualification to military or federal specifications. The justification and rules are covered in the DoD 4120.3-M manual, Chapter 4. Briefly, qualification is justified when one or more of the following apply: (1) The time to conduct one of the tests exceeds 30 days, (2) conformance inspection will require special equipment, (3) specification covers life survival or emergency life-saving equipment. The committee preparing the specification that calls for qualification will be asked to show that: (1) there is no other practical way of obtaining evidence of the availability of products to meet the specification in a reasonable time independent of that acquisition and (2) two or more sources are available and willing to submit their products for qualification.

B25.4.2 When qualification is determined to be feasible and necessary, it shall be included in the Supplementary Requirements section with wording similar to:

Items furnished under this specification shall be products that are qualified for listing on the applicable qualified products list at the time set for opening of bids.

Qualification testing (as distinct from acceptance testing) shall be specifically identified with accept/reject criteria. A statement shall be made

concerning retention of qualification. This may either be a manufacturer's periodic self-certification, a periodic submission of test results, or a complete retest of the product. A statement similar to the following shall be included:

With respect to products requiring qualification, awards will be made only for products that are, at the time set for opening of bids, qualified for inclusion in Qualified Parts List (QPL No.) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Parts List is (insert name and address of qualifying organization(s)) and information pertaining to qualifications of parts may be obtained from that activity.

## **B26. Annexes and Appendixes**

B26.1 Additional information may be included in one or more annexes or appendixes to the specification.

B26.2 The words "Mandatory Information" shall be included directly under the title of annexes and the words "Nonmandatory Information" shall be included directly under the title of appendixes.

B26.3 *Annexes*— Include in annexes any detailed information such as that on apparatus or materials that is a mandatory part of the specification but too lengthy for inclusion in the main text. Annexes shall precede appendixes.

B26.4 *Appendixes*— There are times when it is desirable to include in a specification additional information for general use and guidance, but which does not constitute a mandatory part of the specification. It is appropriate to include such informational material in appendixes. Examples of material that has been included in such appendixes are tables showing approximate relationship between tensile strength and hardness, list of preferred thickness of plate, sheet, and strip reproduced from other documents, tables of standard mass and standard sizes, information on typical applications of the material covered, and information on typical physical properties whose definite values are not prescribed in the specification.

## **B27. References**

B27.1 Include only references to publications supporting or providing needed supplementary information. Historical and acknowledgment references are not recommended. If there are five or more references, list them in an unnumbered section at the end of the specification in the order in which they appear in the text. If there are fewer than five literature references, use footnotes (see Section G21).

## **B28. Footnotes**

B28.1 *General*— Footnotes referenced in the text are intended only for reference and shall never include any information or instructions necessary for the proper application of the specification. Table footnotes are a part of the table. Use consecutive superior numerals for reference to footnotes except in connection with tables, in which case use italic capital letters.

B28.2 *Committee Jurisdiction and History*— Footnote 1 shall include in the first paragraph the committee having jurisdiction and, where the committee so requests, the subcommittee. The second paragraph shall include history information as follows: (1) approval date of latest revision, (2) month and year of publication, (3) designation and year of original issue, (4) designation and year of previous issue, and (5) information as to the other standards that may have been replaced by the standard, year of redesignation, etc.

B28.3 *Literature References*— Use footnotes for references if there are fewer than five. For five or more see Section B27, observing the limitations noted therein. Also see Section G21.

B28.4 *Sources of Apparatus*— Where apparatus may be special or not readily available from more than one source, the source may be referenced. (However, see Section F4 for detailed rules.)

B28.5 *Research Reports*— Reference in a footnote the availability of research reports (see Section B31).

## **B29. Notes**

B29.1 Notes in the text shall not include mandatory requirements. Notes are intended to

set explanatory material apart from the text itself, either for emphasis or for offering informative suggestions not properly part of the standard. Clarification of the description of required apparatus or procedure and modifications required or permitted in certain cases belong in the text itself. If inclusion of the contents yields a different result, then that information is considered mandatory for the performance of the standard and shall be located in the text. Notes may be preferable for detailed description of auxiliary procedures (for example, correction of barometric pressure in a test method not primarily concerned with pressure). Table notes are a part of the table and are mandatory provisions.

**B29.2** Notes appearing in a given standard shall be numbered in sequence and should appear at the end of the paragraph to which they pertain. If it is necessary to refer to a text note in connection with a specific word or phrase in the text, that word or phrase should be followed by a reference to the note, “NOTE 1”), etc.

**B29.3** Notes in the text are preferred for the following:

**B29.3.1** To refer to editorial changes made in the text.

**B29.3.2** To refer to similar or companion ASTM standards.

**B29.3.3** Description, if included under “Scope,” of experimental means for recognizing cases where the method is not applicable to the material under test.

**B29.3.4** Description of additional (not alternative) apparatus, materials, procedures, or calculations that are not actually required; or description of merely recommended forms of construction of required apparatus.

**B29.3.5** Explanation, if needed, of the reasons for a certain requirement or direction. If brief, include in the text rather than as a note.

**B29.4** *Patent Disclaimer of Liability*— See Section 15 of the [Regulations Governing ASTM Technical Committees](#). This note, quoted in F3.2 and not numbered, is generally placed at the end of the standard. Questions regarding the applicability of this section should be referred to the Staff Manager of your committee.

**B29.5** *General Statement of ASTM Policy*— This note, quoted in F2.3 and not numbered, is generally placed at the end of the standard after the note on Patent Disclaimer of Liability.

## **B30. Adjuncts**

**B30.1** Occasionally it is not practicable to publish as an integral part of the standard, because of its nature, material that may be required for use of the standard. Such material is published as an adjunct.

**B30.2** Include a description of the adjunct in the text of the standard. If appropriate, include a figure (illustration) of the adjunct.

**B30.3** When adjunct material is indicated, it shall be made available at the time of publication of the standard.

**B30.4** Include all referenced adjuncts in the Referenced Documents section (see Section A6).

**B30.5** Examples of adjuncts are as follows:

**B30.5.1** Comparison standards such as the copper strip corrosion standards for Test Method D130 (lithograph aluminum strips),

**B30.5.2** Charts such as the viscosity-temperature charts for liquid petroleum for D341,

**B30.5.3** Reference radiographs such as E155 or reference photographs, such as E125,

**B30.5.4** Technical data such as the twelve volumes of D1250, Petroleum Measurement Tables, and

**B30.5.5** Drawings such as detailed drawings for the construction of the smoke chamber in Test Method D2843.

## **B31. Research Reports**

**B31.1** Research reports, which include historical or round-robin information, or other data, shall be sent to Headquarters, where they are given a file number and may be obtained upon request. Such reports may be referenced in a footnote (see B28.5). If the specification contains a detailed test method, the requirements in Section A29 apply.

## **B32. Rationale (Commentary)**

**B32.1** The inclusion of a rationale (commentary) section in ASTM standards is encouraged to ensure that brief and concise documentation is available to the user of the standard and to

provide traceability and clarification of past actions. This documentation might include: (1) a brief history of the development of a new standard or revision to an existing standard including when and why the effort was initiated, (2) reasons and justification for requirements, (3) documentation of factors considered, and (4) listing of technical sources and literature.

B32.2 If included, this information shall appear in an appendix of the standard.

B32.3 Examples of standards that include sections on rationale:

E84, Test Method for Surface Burning Characteristics of Building Materials

F746, Test Method for Pitting or Crevice Corrosion of Metallic Surgical Implant Materials

F763, Practice for Short-Term Screening of Implant Materials

### B33. Part Numbering

B33.1 *General*— Part-numbering systems may be included in an ASTM specification. The part-numbering system shall be placed in the appendix, shall be called out “when specified” as a supplementary requirement, and shall be referenced to appropriately under either “product marking,” “packaging and package marking,” or both places.

B33.2 *When Used for DOD Procurement:*

B33.2.1 The inclusion of a part-numbering system should be considered by technical committees when preparing specifications. Although it is a committee decision whether or not to include part numbering, ASTM International encourages such inclusion in specifications to make them more readily usable directly in procurement and supply applications.

B33.2.2 Part numbers shall be kept short and shall not exceed 15 characters. Part numbering shall be uniform for all parts covered by the same specifications; uniformity is also preferred for all part numbers within the same group of closely related items.

B33.3 *Criteria for Inclusion of Part Numbers:*

B33.3.1 In development of standards that embrace end products, every attempt should be made to define all product variables so as to enable one product to be positively distinguished

from another (from both an engineering and stocking viewpoint). Each product so covered shall be assigned a part number that:

- Is uniquely identifying.
- Includes the document (standard) number.
- Does not exceed 15 characters including dashes, slashes, spaces, etc.
- Does not include the letters “I,” “O,” “Q,” “S,” “X,” and “Z.”
- Does not change when the document is changed in a manner that does not affect interchangeability.
- Does not change when the product is modified so as to not be interchangeable. (In such instances, appropriate usage guidance will be provided if appropriate.)

B33.3.2 All standards that include part numbers shall contain a five-digit numerical manufacturers’ code as assigned by the U.S. Government under the Federal Cataloging Program. (See Fig. B1.)

B33.3.3 An example of a part-numbering system appears in ASTM Specification F1667, for Driven Fasteners: Nails, Spikes, and Staples.

### B34. Summary of Changes

B34.1 If the committee chooses to provide a Summary of Changes, place this unnumbered section at the end of the standard and begin with the following introductory paragraph:

Committee XXX has identified the location of selected changes to this standard since the last issue (insert designation and year date) that may impact the use of this standard.

B34.2 An asterisk will appear after the Scope (**Scope\***) with the following wording at the bottom of the first page:

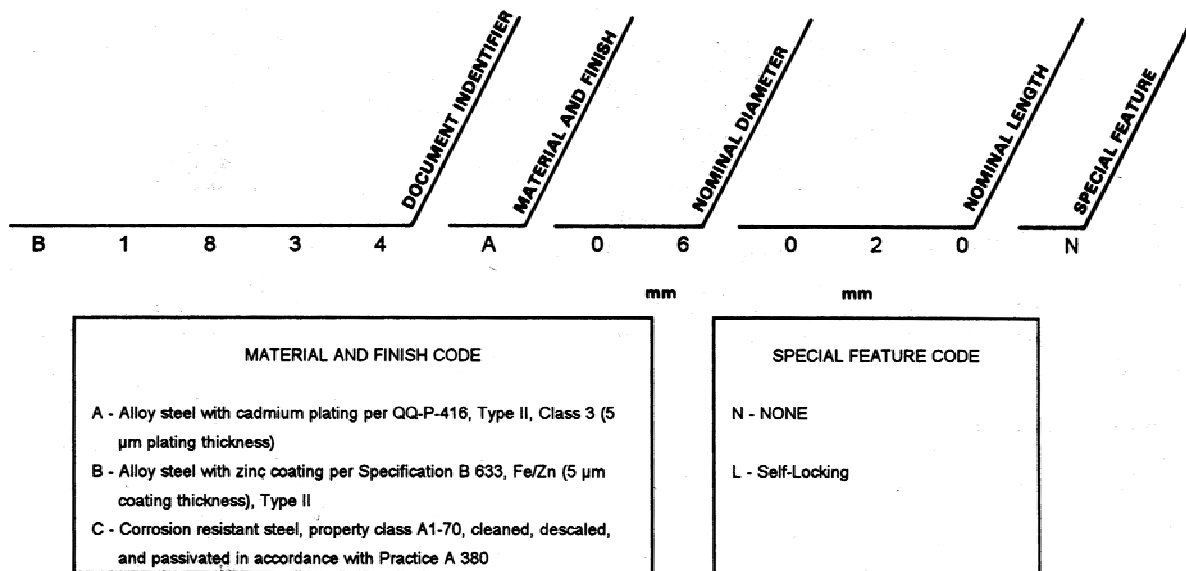
**\*A Summary of Changes section appears at the end of this standard.**

B34.3 Next list, by section or subsection, changes made since the last issue that may impact the use of the standard. For standards that have undergone multiple revisions in a short period of time, keep the Summary of Changes in the

standard for 18 months. This will ensure that all changes from one publication of the Annual Book of ASTM Standards to the next are recorded. Brief descriptions of the changes and reasons for the changes may be included. If desired, a more extensive description of reasons for the changes should be placed in the appendix.

B34.4 An example of the list of changes is:

- (1) Deleted Section 5 and renumbered subsequent sections.
- (2) Updated precision statement in Section 10 to reflect the results of a recent interlaboratory study.
- (3) Revised hardness requirements in Table 2.
- (4) Revised Section 14 on Product Marking.



Example: B1834A06020N indicates a Screw Cap, Hexagon Socket Button Head, SI, made of Cadmium Plated Alloy Steel, 6 mm in diameter, 20 mm in length, and no special feature

**FIG. B1 Part Numbering System Covering Standard Items Used by U.S. Government**

## PART C

### FORM OF OTHER TYPES OF ASTM STANDARDS

#### INTRODUCTION

In addition to test methods and specifications, ASTM standards take other forms, including the following:

|   |                       |
|---|-----------------------|
| Classifications                         | Reference Radiographs |
| Practices                               | Reference Photographs |
| Guides                                  | Tables                |
| Terminology or Definitions (see Part E) | Charts                |

As a committee attempts to develop a standard, the question of differentiation between a practice and a guide may arise. In general, a practice underscores a general usage principle whereas a guide suggests an approach. A standard practice connotes accepted procedures for the performance of a given task. Refer to definitions given on p. vii. A guide may propose a series of options or instructions that offer direction without recommending a definite course of action. The purpose of this type of standard is to offer guidance based on a consensus of viewpoints but not to establish a standard practice to follow in all cases. A guide is intended to increase the awareness of the user concerning available techniques in a given subject area, while providing information from which subsequent testing programs can be derived.

Regarding reference radiographs, reference photographs, tables, and charts, there are relatively few subject headings, and the form of the standard is left to the jurisdiction of the sponsoring committee. The first two types listed in the introduction to Part C, however, are most common and are given greater treatment below.

Special instructions with respect to the legal aspects are included in Part F and shall be followed in writing any standard. These include such matters as contractual items, caveat statements, patents, and fire standards. Assistance on development of fire standards is available from Committee E05. The policies contained in Part F are approved by and are under the jurisdiction of the ASTM Board of Directors.

When a standard is being developed, the costs associated with its development and subsequent use generally should be considered. The prime objective should be the optimum use of resources to achieve satisfactory definition of the product or service. However, it should be noted that when the standard relates to the safety of persons, cost considerations are likely to become much less important than when attributes of materials or products are involved. Some standards, such as a definition, impose no cost on the user; others that include numerous and extensive requirements can entail significant expense to users of the standard. The requirements to be included should, therefore, be those that are technically relevant and yield benefits commensurate with the cost of their determination.

Cost effectiveness statements or rationale may be included within a standard if appropriate, usually in an appendix.

#### CLASSIFICATIONS

##### C1. Description

C1.1 “A classification is a systematic arrangement or division of materials, products,

systems, or services into groups based on similar characteristics such as origin, composition, properties, or use.”<sup>1</sup>

<sup>1</sup>From [Regulations Governing ASTM Technical Committees](#).

C1.2 Classifications provide a time- and space-saving shorthand for specifying the above description.

C1.3 Classifications may be defined by each committee differently because of the unique nature of that committee. A collection or grouping of definitions to one committee may be termed a classification while still another committee may group objects or properties in a classification.

## **C2. Subject Headings of Text**

C2.1 The following is the sequence for the text of ASTM classifications. Headings are those most generally used but may not be all-inclusive. It may be necessary to include other headings for specialized subjects. The headings identified as “mandatory” are required. Other headings shall be included when the subject matter is pertinent to the document under development; in which case, all instructions and guidance for that particular section shall be followed. For example, if the standard does not contain reference to any standard documents within the text, it is not required to include a section on Referenced Documents. If, however, specific hazards are cited throughout the text, then the section on Hazards (see Section A13) shall be followed. Not all of these headings may be required for a particular standard. The use of footnotes and notes shall follow Sections A26 and A27 respectively. Additional headings that are included to cover specialized subjects should appear in the most appropriate place and sequence depending on their relation to the sections below.

Title (mandatory)  
Designation (mandatory)  
Scope (mandatory)  
Referenced Documents  
Terminology  
Significance and Use (mandatory)  
Basis of Classification (mandatory)  
Test Methods and Retest  
Keywords (mandatory)  
Annexes and Appendixes  
Summary of Changes

## **C3. Title (Mandatory)**

C3.1 The title of a classification standard should be concise, but complete enough to iden-

tify the nature of the basis for classification, for specific materials, systems, services, and products.

## **C4. Designation (Mandatory)**

C4.1 The ASTM designation is assigned by Headquarters on submittal for approval. Refer to Sections A3 or B4 for sequential parts of numbering.

## **C5. Scope (Mandatory)**

C5.1 Include in this section information relating to the purpose of the classification. Concisely state what characteristics have been classified and the materials, products, systems, or services to which the classification applies. Where applicable state any limitations to the use of the classification.

C5.2 Include in this section the system of units to be used in referee decisions.

C5.3 Include, where applicable, comparisons of the classification to other similar classifications.

## **C6. Referenced Documents**

C6.1 List here in alphanumeric sequence the designation number and complete title of all documents referenced within the classification. Refer to Section A6 for further information.

## **C7. Terminology**

C7.1 See Section A7.

## **C8. Significance and Use (Mandatory)**

C8.1 Include in this section information relating to the relevance of the classification. State how the classification is used and who would typically use it.

## **C9. Basis of Classification (Mandatory)**

C9.1 The basis of classification is in fact the most important portion of the document. This heading sets up categories in which groupings are made. For example, ASTM Classification D388,

of Coals by Rank (Vol 05.06) defines classification of higher rank coals according to fixed carbon on a dry basis while lower rank coals are classed according to caloric value on the moist basis.

### **C10. Test Methods and Retest**

C10.1 Properties enumerated in a classification may be determined in accordance with specific test methods. These methods should be referenced in this portion of the document.

C10.2 Because of variability resulting from sampling and a lack of satisfactory reproducibility, and in instances when the first test results do not conform to the requirements prescribed in this classification, then a retest option may be provided.

### **C11. Keywords (Mandatory)**

C11.1 In this section, identify the words, terms, or phrases that best represent the technical information presented in the standard. Select the keywords from the title and body of the document and include general, vernacular, and trade terms. These keywords will be used in the preparation of the ASTM Subject Index.

C11.2 Select three or more keywords that describe the names of tests, procedures, special materials, or the specific application(s) that will facilitate the identification and retrieval of the standard.

C11.3 All selected keywords shall be stand-alone terms; the type of standard, incomplete phrases, unattached adjectives, etc., shall not be used.

### **C12. Annexes and Appendixes**

C12.1 Supplementary information is provided herein to aid in understanding and using the standard.

C12.2 Annexes (see A24.3).

C12.3 Appendixes (see A24.4).

### **C13. Examples**

C13.1 Examples of classifications are:

D388 Classification of Coals by Rank

D3475 Classification of Child-Resistant Packages

### **C14. Summary of Changes**

C14.1 If the committee chooses to provide a Summary of Changes, place this unnumbered section at the end of the standard and begin with the following introductory paragraph:

Committee XXX has identified the location of selected changes to this standard since the last issue (insert designation and year date ) that may impact the use of this standard.

C14.2 Next list, by section or subsection, changes made since the last issue that may impact the use of the standard. Brief descriptions of the changes and reasons for the changes may be included.

C14.3 An example of the list of changes is:

- (1) Deleted Section 5 and renumbered subsequent sections.
- (2) Updated precision statement in Section 10 to reflect the results of a recent interlaboratory study.
- (3) Revised hardness requirements in Table 2.
- (4) Revised Section 14 on Product Marking.

## **PRACTICES AND GUIDES**

### **C15. Description**

C15.1 A standard practice is an accepted procedure for the performance of one or more operations or functions. In certain cases practices may include one or more test methods necessary for full use of the practice. Examples of practices include selection, preparation, application, inspection, necessary precautions for use or dis-

posal, installation, maintenance, and operation of testing apparatus.

C15.2 A standard guide is a compendium of information or series of options that does not recommend a specific course of action. Guides are intended to increase the awareness of information and approaches in a given subject area. Guides may propose a series of options or

instructions that offer direction without recommending a definite course of action. The purpose of this type of standard is to offer guidance based on a consensus of viewpoints but not to establish a standard practice to follow in all cases.

## C16. Subject Headings of Text

C16.1 The following is the sequence for the text of ASTM practices and guides. Headings are those most generally used but may not be all-inclusive. It may be necessary to include other headings for specialized subjects. The headings identified as “mandatory” are required. Other headings shall be included when the subject matter is pertinent to the document under development; in which case, all instructions and guidance for that particular section shall be followed. For example, if the standard does not contain reference to any standard documents within the text, it is not required to include a section on Referenced Documents. If, however, specific hazards are cited throughout the text, then the section on Hazards (see Section A13) shall be followed. The use of footnotes and notes shall follow Sections A26 and A27 respectively.

Title (mandatory)  
 Designation (mandatory)  
 Scope (mandatory)  
 Referenced Documents  
 Terminology  
 Summary of Practice  
 Significance and Use (mandatory)  
 Reagents  
 Procedure  
 † Test Methods  
 Report  
 Keywords (mandatory)  
 Annexes and Appendixes  
 Summary of Changes

†Test Methods included shall contain the mandatory headings included in Section A1, except for title and designation.

C16.2 Not all of these headings may be required for a particular standard. Additional headings that are included to cover specialized subjects should appear in the most appropriate place and sequence depending on their relation to the sections listed in C16.1.

## C17. Title (Mandatory)

C17.1 The title should be concise but complete enough to identify the nature of the practice.

It should identify the subject of application and should be distinguishable from similar titles (see A2.1 as it applies to titles of test methods).

## C18. Designation (Mandatory)

C18.1 The ASTM designation is assigned by Headquarters on submittal for approval. Refer to Sections A3 and B4 for sequential parts of numbering.

## C19. Scope (Mandatory)

C19.1 Include in this section information relating to the purpose of the practice or guide and to what it applies. Clearly state any limitations of the practice or guide.

C19.2 Include in this section the system of units to be used in referee decisions.

C19.3 Include in this section any caveats required by ASTM policy such as *safety hazards* (see F2.1) and *fire hazards* (see F2.2).

C19.4 For standards developed for reference in model (building) codes, include the following statement:

The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

## C20. Referenced Documents

C20.1 List here in alphanumeric sequence the designation number and complete title of all documents referenced within the practice (or guide). Refer to Section A6 for further information.

## C21. Terminology

C21.1 See Section A7 and Part E.

## C22. Summary of Practice

C22.1 Include here a brief outline of the practice, describing its essential features without the details that are a necessary part of the complete statement of procedure and sequence. If desired, a brief statement of the principle of the practice may be given.

**C23. Significance and Use (Mandatory)**

C23.1 Include in this section information that explains the relevance and meaning of the practice (or guide). State the practical uses for the practice and how it is typically employed. Avoid repetition of information included in the Scope (see Section C19).

C23.2 Include separately any appropriate comments on limitations of the practice. Indicate any means of recognizing cases where the practice may not be applicable.

C23.3 Include, where applicable, comparisons of the practice (or guide) to other similar procedures.

**C24. Reagents**

C24.1 See Section A12.

**C25. Procedure**

C25.1 Include in the procedure detailed directions for performing the task outlined in the practice.

C25.2 In some cases, to aid in clarity, a diagrammatic, photographic, or schematic may be of value to the user of the practice. These shall be supplied to the ASTM editorial staff as originals. An excellent example of this type of approach is illustrated in ASTM Practice D2855, for Making Solvent-Cemented Joints with Poly-(Vinyl Chloride) (PVC) Pipe and Fittings.

**C26. Test Methods**

C26.1 List standard test methods for measurement of all requirements of practices or guides. Refer to the ASTM test methods used in testing the material to determine conformance with the practice or guide. This includes sampling, chemical analysis, mechanical, electrical, thermal, optical, and other testing procedures. When alternative procedures are given in test methods, it is important to state which particular procedure shall be used as the basis for the practice or guide requirement.

C26.1.1 Examples of standard practices that include multiple test methods:

D4169 Practice for Performance Testing of Shipping Containers

E679 Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series Method of Limits

E795 Practices for Mounting Test Specimens During Sound Absorption Tests

C26.2 When there is no ASTM test method specified for a particular quality or property of a specified material, describe the test procedure to be followed in detail in the practice (or guide), following the Form of ASTM Test Methods (Part A of this publication). Include all mandatory information listed in A1.1 (title, scope, significance and use, hazards, procedure, precision and bias).

C26.3 Where a method of some other organization is being used and the committee has not approved the test as an ASTM test method, then it is preferable to describe the test in detail in the practice or guide and to include a footnote reference to the original source. Obtain appropriate copyright releases.

C26.4 State all procedures in the imperative mood.

**C27. Report**

C27.1 Include detailed information as to calculating, interpreting, and reporting results in this section.

C27.2 Depending upon the nature of the practice, an entire section may, by necessity, be devoted to calculation or interpretation of results, or both.

C27.3 When a practice permits variance in conditions under which the standard practice has been performed, these conditions should become part of the report.

**C28. Keywords (Mandatory)**

C28.1 In this section, identify the words, terms, or phrases that best represent the technical information presented in the standard. Select the keywords from the title and body of the document and include general, vernacular, and trade terms. These keywords will be used in the preparation of the ASTM Subject Index.

C28.2 Select three or more keywords that describe the names of tests, procedures, special

materials, or the specific application(s) that will facilitate the identification and retrieval of the standard.

C28.3 All selected keywords shall be stand-alone terms; the type of standard, incomplete phrases, unattached adjectives, etc., shall not be used.

## **C29. Annexes and Appendixes**

C29.1 Supplementary information is provided herein to aid in understanding and utilizing the standard.

C29.2 Annexes (see A24.3).

C29.3 Appendixes (see A24.4).

## **C30. Rationale**

C30.1 The inclusion of a rationale (commentary) section in ASTM standards is encouraged to ensure that brief and concise documentation is available to the user of the standard and to provide traceability and clarification of past actions. This documentation might include: (1) a brief history of the development of a new standard or revision to an existing standard including when and why the effort was initiated, (2) reasons and justification for requirements, (3) documentation of factors considered, and (4) listing of technical sources and literature.

C30.2 If included, this information shall appear in an appendix of the standard.

C30.3 Examples of standards that include sections on rationale:

E84 Test Method for Surface Burning Characteristics of Building Materials

F746 Test Method for Pitting or Crevice Corrosion of Metallic Surgical Implant Materials

F763 Practice for Short-Term Screening of Implant Materials

## **C31. Summary of Changes**

C31.1 If the committee chooses to provide a Summary of Changes, place this unnumbered section at the end of the standard and begin with the following introductory paragraph:

Committee XXX has identified the location of selected changes to this standard since the last issue (insert designation and year date) that may impact the use of this standard.

C31.2 An asterisk will appear after the Scope (Scope\*) with the following wording at the bottom of the first page:

**\*A Summary of Changes section appears at the end of this standard.**

C31.3 Next list, by section or subsection, changes made since the last issue that may impact the use of the standard. For standards that have undergone multiple revisions in a short period of time, keep the Summary of Changes in the standard for 18 months. This will ensure that all changes from one publication of the Annual Book of ASTM Standards to the next are recorded. Brief descriptions of the changes and reasons for the changes may be included. If desired, a more extensive description of reasons for the changes should be placed in the appendix.

C31.4 An example of the list of changes is:

- (1) Deleted Section 5 and renumbered subsequent sections.
- (2) Updated precision statement in Section 10 to reflect the results of a recent interlaboratory study.
- (3) Revised hardness requirements in Table 2.
- (4) Revised Section 14 on Product Marking.

## PART D

# USE OF THE MODIFIED DECIMAL NUMBERING SYSTEM

## INTRODUCTION

In recent years, “point” systems for numbering sections of a document have come into extensive use. Many national organizations, associations, societies, industrial concerns, and government agencies are using a Modified Decimal Numbering (MDN) System. MDN is also used by standardization organizations.

In 1963, ASTM International adopted the MDN System for ASTM standards. This guide has been prepared for the use of members who are drafting or revising standards. The object of the MDN System is to assign to each division in a text a unique number that shows the relationship of the specific section to all previous sections and gives a complete designation which does not require reference to previous sections or pages.

### D1. Scope

D1.1 The Modified Decimal Numbering (MDN) System is designed primarily for numbering the text division in standards.

D1.2 The MDN System is also referred to as the “Point” System.

### D2. Parts of a Standard

D2.1 All documents are considered to consist of several primary divisions called primary sections. A primary section may include one or more secondary sections. A secondary section may include one or more ternary sections which in turn may include one or more quaternary sections.

D2.2 The terms “primary section,” “secondary section,” “ternary section,” and “quaternary section” shall not be used in headings or references.

D2.3 References shall be made by referring to only the number when referring to secondary, ternary, and quaternary sections. Refer to primary sections as “Section 4” or “Sections 5 to 9.”

D2.4 Either of the generic words “section” or “division” may be used in correspondence or other communication, but shall not be used in references, other than primary, as directed in D2.2 and D2.3.

### D3. Assignment of Numbers

D3.1 Number the primary sections of a standard serially, beginning with 1 or “Scope,” using as many numbers as required by the number of sections.

D3.2 Assign to the successive secondary sections of any primary section a two-part number consisting of the number used for the primary section followed by a decimal point and a consecutive number, beginning with 1, using as many numbers as required by the number of secondary sections. For example, if there are eleven secondary sections in the fifth section of a standard, designate these secondary sections 5.1, 5.2, 5.3 ... 5.9, 5.10, and 5.11.

D3.3 Assign to the successive ternary sections in a secondary section a three-part number consisting of the two-part number assigned to the secondary section followed by a decimal point and a consecutive number, beginning with 1, using as many numbers as required by the number of ternary sections. For example, if there are four ternary sections in secondary section 8.4, designate the ternary sections, 8.4.1, 8.4.2, 8.4.3, and 8.4.4.

D3.4 Assign to each of the successive quaternary sections in a ternary section a four-part number consisting of the three-part number assigned to the ternary section followed by a decimal point and a consecutive number, beginning with 1, using as many numbers as required by the number of quaternary sections. For

example, if there are three quaternary sections in the second ternary section of secondary section 8.4, designate them 8.4.2.1, 8.4.2.2, and 8.4.2.3.

D3.5 There shall be no further subdivision beyond that allowed by the four-part number. The judicious use of unnumbered center headings may help in the adherence to this rule.

#### **D4. Supplementary Requirements**

D4.1 Designate each supplementary requirement by the letter “S” followed by a consecutive number, beginning with 1 for the first supplementary requirement.

D4.1.1 There shall be no decimal point between the “S” and the number.

D4.1.2 Do not renumber supplementary requirement designations once deleted.

D4.2 Designate primary, secondary, and ternary sections of each supplementary requirement as shown in D3.2, D3.3, and D3.4, respectively.

NOTE D1—Primary sections of a supplementary requirement, an annex, or an appendix are numbered the same as a secondary section of the main standard (with two-part numbers); secondary and ternary sections of a supplementary requirement, an annex, or an appendix are, therefore, numbered the same as ternary and quaternary sections (with three and four-part numbers), respectively, of the standard.

D4.3 No individual supplementary requirement shall be subdivided into more than three levels in accordance with D3.5.

#### **D5. Literature References**

D5.1 Where a document includes five or more literature references, list them in a separate unnumbered section at the end of the document, preceding annexes and appendixes. Assign a one-part number of each individual reference. See Section G21 of this publication.

#### **D6. Annexes and Appendixes**

D6.1 Separate annexes and appendixes from the main text with the centered headings ANNEX(ES) and APPENDIX(ES).

D6.2 Precede the title of each annex by the letter “A” followed by a number in consecutive order, beginning with 1 for the first annex (A1,

A2, A3, etc.) Precede the title of each appendix by the letter “X” followed by a number in consecutive order, beginning with 1 for the first appendix (X1, X2, X3, etc.)

D6.2.1 There shall be no decimal point between the “A” or “X” and the number.

D6.3 Designate primary, secondary, and ternary sections of each annex or appendix as shown in D3.2, D3.3, and D3.4, respectively (NOTE D1) (for example, A1.1, A1.1.1, and A1.1.1.1).

D6.4 No individual annex or appendix shall be subdivided into more than three levels in accordance with D3.5.

#### **D7. Equations**

D7.1 Equations should be numbered when two or more are included in the main text of the standard (see G16.6). Designate equations with consecutive arabic numbers beginning with 1. Number each equation in the order that it appears in the standard, regardless of the section number in which it is referenced.

D7.2 Designate equations in annexes and appendixes by the designation of the annex or appendix followed by consecutive numbers beginning with 1 (for example, Eq A1.1, A2.4, X3.2).

#### **D8. Tables**

D8.1 Assign consecutive arabic numbers to successive tables throughout the main text of the standard without regard to the number assigned to the section in which the table is referenced.

D8.2 Designate tables in annexes and appendixes by the designation of the annex or appendix followed by consecutive numbers beginning with 1 (for example, Table A1.1, A2.4, X3.2). Tables shall follow directly the appropriate annex or appendix.

#### **D9. Figures**

D9.1 Assign consecutive arabic numbers to successive figures throughout the main text of the standard without regard to the number assigned to the section in which the figure is referenced.

D9.2 Designate figures in annexes and appendixes by the designation of the annex or appendix followed by consecutive numbers

beginning with 1 (for example, Fig. A1.1, A2.4, X3.2). Figures shall follow directly any tables of the appropriate annex or appendix.

#### **D10. Text Notes**

D10.1 Assign consecutive numbers to successive notes throughout the main text of the standard without regard to the number assigned to the section to which the note may refer. Notes shall be indicated by the word “NOTE” followed by the number.

D10.2 Designate notes in annexes by the letter “A” and in appendixes by the letter “X,” followed by consecutive numbers, beginning with 1.

D10.3 Designate notes pertaining to figures by consecutive numbers, beginning with 1 for the first note to each individual figure.

#### **D11. Footnotes**

D11.1 Assign consecutive numbers to successive footnotes throughout the standard, including supplementary requirements, annexes, and appendixes, without regard to the number assigned to the section in which the footnotes appears.

NOTE D2—Since Footnote 1 is required for sponsoring committee and year date of a standard, the first footnote referenced in the body of the text is Footnote 2.

D11.2 Designate footnotes to tables by consecutive letters, beginning with “A” for the first footnote to each individual table.

D11.3 Footnotes shall be referenced by superscript numbers, or, in the case of tables, by superscript italic capital letters.

#### **D12. Combination of Systems**

D12.1 Do not use a combination of the MDN System and other systems for designating secondary, ternary, and quaternary sections. For example, do not divide 8.4 into 8.4 (a), 8.4 (b), and 8.4 (c), rather than the 8.4.1, 8.4.2, and 8.4.3 as directed in D3.3.

#### **D13. Omission of Numbers**

D13.1 Do not assign MDN numbers to examples that are numbered serially throughout a document.

D13.2 Do not assign numbers to centered headings when used.

#### **D14. Introductory Sections**

D14.1 Where a standard has a preliminary section with a heading such as “Introduction” or “Foreword,” do not assign this section a number so that “Scope” shall always be designated with the one-part number “1” in accordance with D3.1.

#### **D15. General Application**

D15.1 Exercise care to distinguish between successive, parallel, and alternative sections and supplementary sections such as secondary, ternary, and quaternary sections. Only the latter three require the addition of another decimal point and number. Note also the manner of handling alternative clauses within a section. For example:

##### 10. Procedure

10.1 Dry the specimen by either (1) heating at 105EC (221EF) for 2 h, or (2) holding the specimen in a conditioned atmosphere until dry to the touch.

Note that the above example is a single sentence and no further numbering breakdown is required.

##### 10. Procedure

10.1 Make all tests on conditioned specimens using the procedure given in 10.3 and 10.4.

10.2 Calibrate the tension testing machine and see that the oven is at the specified temperature.

##### 10.3 *Variable Frequency Procedure:*

10.3.1 Adjust the ...

10.3.2 Insert the ...

##### 10.4 *Variable Tension Procedure:*

10.4.1 Start the ...

10.4.2 Clamp the ...

Note that in the above example, 10.3 and 10.4 are successive subdivisions of 10, not subdivisions of 10.1 or 10.2.

#### **D16. Problems**

D16.1 Any problems in the implementation of the MDN System in ASTM standards should be referred to the ASTM Director of Standards Publications for resolution.

## PART E

# TERMINOLOGY IN ASTM STANDARDS

## INTRODUCTION

ASTM standard terminology is written to promote three objectives: (1) precise understanding and interpretation of ASTM standards, (2) standardization of terminology in standards, reports, and other technical writings, and (3) explanation of the meanings of technical terms for the benefit of those not conversant with them.

For terminology to be effective, it should be used consistently. It is, therefore, the responsibility of each technical committee to manage terminology usage in all standards for which it has jurisdiction to ensure that usage is consistent both within the committee and the Society. Part E provides guidance to technical committees and to those who review the work of technical committees regarding the principles of terminology.

### E1. Terminology Management

E1.1 In ASTM International, technical committees are responsible for defining terminology within technical standards and for developing terminology as a type of standard. Terminology ensures precise interpretation of ASTM standards and explains technical terms for the benefit of users who are not conversant with the language of the standard. Use terminology that is clear, explicit, and not liable to misinterpretation when referred to in technical operations, commercial contracts, or legal proceedings.

E1.2 Terminology in a technical standard may include *definitions of terms* and *definitions of terms specific to a standard* and explanations of *symbols*, *abbreviations*, and *acronyms* that are necessary for the reader to understand that particular standard.

E1.3 All technical standards should contain a *Terminology* section that includes *definitions of terms* or *definitions of terms specific to a standard*, or both. Reference to a related terminology standard(s) can be sufficient for this section.

E1.4 All technical committees should develop and maintain a general terminology standard. Terminology, as a type of standard, is comprised of *definitions of terms* and explanations of *symbols*, *abbreviations*, and *acronyms* pertaining to the scope of a technical committee or a specialized field within the committee.

### E2. Definitions of Terms and Definitions of Terms Specific to a Standard

E2.1 The distinction between *definitions of terms* and *definitions of terms specific to a standard* is related to the degree of application. If a term has a meaning more specialized than its commonly used language, is used by two or more subcommittees within a committee, or appears in several standards, it is labeled as a *definition of a term*. When the term is limited in application to the standard in which it needs to be defined, it is labeled as a *definition of a term specific to a standard*. *Definitions of Terms* and *Definitions of Terms Specific to a Standard* appear in separate subsections within the *Terminology* section of a technical standard. Since *definitions of terms specific to a standard* have limited application, they do not generally appear in a technical committee's general terminology standard.

E2.1.1 An example of a *definition* is:

X.x **dolly**, *n*—a low platform or structure mounted on wheels or casters, designed primarily for moving bulky loads for short distances. (Compare **pallet**)

D996

E2.1.2 An example of a *definition specific to a standard* is:

X.x **standard**, *n*—as used in ASTM International, a document that has been developed and established within the consensus principles of the Society and that meets the approval requirements of ASTM procedures and regulations.

Form and Style for ASTM Standards

### E3. Guidelines for Writing Definitions of Terms and Definitions of Terms Specific to a Standard

E3.1 Use these guidelines when writing both *definition of terms* and *definitions of terms specific to a standard*.

E3.2 Prepare a definition when:

E3.2.1 Any term used in a standard is essential to the interpretation and application of the standard;

E3.2.2 A term used in a standard is not adequately defined in common language;

E3.2.3 Using qualitative adjectives and nouns that *could* be taken to denote or connote an *absolute, unqualified, or unconditional* property or capability; for example: *waterproof, stainless, unbreakable, vapor barrier, gas-free, flat, safe, rigid, pure*. Such qualitative adjectives and nouns shall not be used unless *actually used and defined* in their absolute sense;

E3.2.4 Describing a *quantitative determinable* property or capability that might cause misinterpretation or confusion; for example: *strong, high, accurate, clean*.

E3.3 Do not develop a definition when:

E3.3.1 A term is adequately defined in reference source material (print or electronic version), unless a definition is required for clarity;

E3.3.2 A term has a well-recognized authoritative meaning such as terms defined in the International System of Units (SI);

E3.3.3 A term is defined acceptably for the committee's purposes in the *ASTM Online Dictionary of Engineering Science and Technology* or the committee's terminology standard;

E3.3.4 A term that meets the committee's needs has been defined in a technical standard of another committee or subcommittee.

### E4. Form of a Definition

E4.1 Write *definitions of terms* and *definitions specific to a standard* in the dictionary-definition form. Include term, part of speech, definition, and, when applicable, a delimiting phrase (see E5.5).

E4.2 Describe the essential characteristics of the term. Keep it simple. Do not include irrelevant details such as how things are made, used, or measured.

E4.3 State the definition without repeating the term defined. Use language that is understandable to non-experts.

E4.4 Complete the definition in one sentence. If two or more phrases are needed to state the meaning, connect them with semicolons. Include any necessary supplementary information as a Discussion.

E4.5 The term and its elements should appear in the following order: term; abbreviation; symbol; dimensions of quantities, measurement units; part of speech; delimiting phrase; statement of meaning, including specification limits where applicable; cross-references to synonyms or related terms; attribution.

### E5. Elements of a Term

E5.1 *Abbreviations*— For terms usually represented by an abbreviation, place a comma and the preferred abbreviation following the term, and then the part of speech, for example:

**average**, *avg*, *n*—

E5.2 *Symbols*— For terms usually represented by a letter symbol, place a comma and the preferred symbol following the term, and then the part of speech, for example:

**ampere**, *A*, *n*—

E5.3 *Dimensions of Physical Quantities*— If the term represents a physical quantity, state its analytical dimension in italics in square brackets immediately following the letter symbol, or if there is none, following the term itself, for example:

**critical height**,  $H_c[L, n]$ —*in earth grading*, the maximum height at which a vertical or sloped bank of soil will stand unsupported under a specific set of conditions.

**D653**

E5.4 *Parts of Speech*— Including the part of speech enables the user to distinguish between closely allied terms; for example:

**flame resistance**, *n*—the ability to withstand flame impingement or give protection from it.

E176

**flame resistant**, *adj*—having flame resistance

E176

**E5.5 Delimiting Phrases**— If a term has different meanings in other technical fields or contexts, include an italicized phrase that delimits the definition to its field of application. This phrase should follow the dash and be separated from the basic statement of meaning by a comma, for example:

**beam**, *n*—*in a balance*, the horizontal pan support.

**beam**, *n*—*in a building*, a horizontal load-carrying structural member of the building frame.

**beam**, *n*—*in optics*, a concentrated unidirectional flow of radiant energy.

E284

**E5.6 Specification Limits**— If a definition involves specification limits applicable only to a specific standard (for example, in defining plate by specifying a thickness range), make the term specific to that standard. If, however, it is intended that this definition be broadly accepted within a specific technical committee or within ASTM International, delimit its scope, for example:

**plate**, *n*—*aluminum products*, a rolled flat product of thickness 6.4 mm (0.25 in.) or greater.

**E5.7 Cross-references**— Cross-references bring together related terms and narrower terms of a given genus. A cross-reference may take the place of a definition, or it may be appended to a definition to draw attention to related definition, for example:

*flat-bed*—see **truck**.

**E5.8 Discussions**— To fill in more detail of the concept being defined, supplementary information may be added as a separate discussion immediately following the definition, for example:

**3.1 builder's model**, *n*—a reference standard of quality for specific building components, denoting, by example, the level of quality adopted by a builder.

**3.1.1 Discussion**—The examples or samples of construction material, permit examination of quality level.

E631

**E5.9 Attributions**— If an existing definition is adopted from another reference source material (for example, technical standard, manual, or dictionary), copy it exactly and identify the original source in a boldface notation at the right margin following the definition.

**E5.9.1** Notify Headquarters that permission to publish shall be obtained from the organization holding copyright. The definition shall not be published without permission.

## **E6. Use of Symbols, Acronyms, and Abbreviations as Terminology**

**E6.1** In standards containing numerous symbols, acronyms, or abbreviations, these items may be listed under the appropriate subheading as a convenience to the user of the standard.

**E6.1.1 Symbols**— Alphabetically list the symbols. Do not assign a number or capitalize the explanation, for example:

*X x Symbols:*

*A* = cross-sectional area of specimen

*B* = normal induction

**E6.1.2 Acronym**— An acronym is a shortened form of a compound term that uses the initial letters of the term to make a pronounceable word. Alphabetically list, and capitalize the acronyms. In a few cases acronyms are written in lower case, such as laser and sonar. Do not capitalize the explanation unless it is a proper noun, for example:

*X x Acronyms:*

*X x.1 PERT*, *n*—*program evaluation and review technique*

*X x.2 radar*, *n*—radio detecting and ranging

**E6.1.3 Abbreviations**— An abbreviation is a shortened form of a compound word or phrase. List the abbreviations alphabetically. Do not include abbreviations appearing in Section G3. Do not capitalize the explanation unless it is a proper noun, for example:

X.x Abbreviations:

X.x.1 *assn*—association

X.x.2 *avg*—average

## FORM OF A TERMINOLOGY STANDARD

### E7. Subject Headings of Text

E7.1 The following list shows in sequence the subjects usually covered in a terminology standard:

Title (mandatory)  
Designation (mandatory)  
Scope (mandatory)  
Significance and Use  
Terminology: Terms and Definitions (mandatory)  
Symbols, Abbreviations, Acronyms  
Keywords (mandatory)  
Annexes and Appendixes  
Bibliography or References  
Summary of Changes

### E8. Title (Mandatory)

E8.1 The title should be as concise as possible but complete enough to identify the subject covered by the terminology. The title of a terminology standard preferably is *Terminology of ...*, although *Terminology Relating to ...* is acceptable.

### E9. Designation (Mandatory)

E9.1 The designation will be assigned by ASTM International Headquarters upon submittal of the standard for Society approval.

### E10. Scope (Mandatory)

E10.1 Provide information about the field of application of the terminology. Include information on how, when, and by whom the terminology will be used. Indicate here whether the terminology standard is general or relates to a specialized field. Where the content of a terminology standard is limited or restricted, as in a specialized terminology standard, the scope statement should so indicate.

### E11. Referenced Documents

E11.1 Include in this section only ASTM standards, adjuncts, and standards or codes of other organizations. All referenced documents shall be cited.

E11.1.1 Provide footnotes to this section to indicate the sources of these documents.

E11.1.2 Do not include the year date when designating referenced documents unless there is a technical reason for specifying a particular year date.

E11.1.3 When listing reference adjuncts, provide a brief description, in this section, and a footnote of their availability.

### E12. Significance and Use

E12.1 When use restrictions exist, include a significance and use statement. Give a warning of them such as: “This terminology is not intended to ...”

### E13. Terminology (Mandatory)

E13.1 *Terms and Their Definitions (Mandatory)*—Compose a definition in the dictionary-definition form (see E4.5) and include the term, part of speech, definition, and when applicable, a delimiting phrase. Boldface the term and italicize the part of speech and delimiting phrase. Do not capitalize the term or any other components of the definition except for proper nouns, acronyms, or any other words capitalized in normal usage. List the terms unnumbered and in alphabetical sequence.

E13.1.1 Although the preferred style of listing terms and their definitions is in alphabetical sequence, in some cases it may be desirable to show the relationships in a logical family of concepts by grouping definitions according to a classification system. Place narrower or subordinate terms and their definitions in alphabetical order under the definition of the broader term, as the main entry, for example:

**soil structure**, *n*—an arrangement and state of aggregation of soil particles in a soil mass.

*flocculent structure*, *n*—an arrangement composed of flocs of soil particles instead of individual soil particles.

*honeycomb structure*, *n*—an arrangement of soil particles having a comparatively loose, stable structure resembling a honeycomb.

*single-grained structure*, *n*—an arrangement composed of individual soil particles, characteristic structure of coarse-grained soils.

**D653**

E13.1.2 *Cross-references*— See E5.7 for rules governing cross-references.

E13.1.3 *Discussions*— See E5.8 for rules governing discussions.

E13.1.4 *Attributions*— See E5.9 for rules governing attributions.

## **E14. Symbols, Acronyms, and Abbreviations**

E14.1 Any of these subsections can be used for the convenience of the user of the standard. Follow the guidelines detailed in Section E6.

## **E15. Keywords**

E15.1 In this section, identify the words, terms, or phrases that best represent the technical information presented in the standard. Select the keywords from the title and body of the document and include general, vernacular, and trade terms. These keywords will be used in the preparation of the ASTM Subject Index.

E15.2 Select three or more keywords that describe the names of tests, procedures, special materials, or the specific application(s) that will facilitate the identification and retrieval of the standard. Keywords for terminology standards should include the words *definitions* and *terminology*.

E15.3 All keywords shall be stand-alone terms; incomplete phrases and unattached adjectives shall not be used.

## **E16. Annexes and Appendixes**

E16.1 To aid in understanding and using the terminology, supplementary information such as illustrations, commentaries, or rationale may be included in annexes (mandatory information), or appendixes (nonmandatory information).

## **E17. Bibliography or References**

E17.1 Supplementary publications, useful for consultation by users who wish to have more detailed information on the particular terminology, may be provided. If the publications are cited in the text, they should be listed in a References section at the end of the standard (see Section A25); otherwise, the section should be titled Bibliography.

## **E18. Summary of Changes**

E18.1 This unnumbered section shall be placed at the end of the standard and begin with the following introductory paragraph:

Committee XXX has identified the location of selected changes to this standard since the last issue (insert designation and year date) that may impact the use of this standard.

E18.2 Next list, by section or subsection, changes since the last issue that may impact the use of the standard. Brief descriptions of the changes and reasons for the changes may be included.

E18.3 An example of the list of changes is:

- (1) Added the term bioconcentration.
- (2) Revised scope.
- (3) Modified the definition for sediment.

## PART F

### CAVEATS AND OTHER LEGAL ASPECTS IN STANDARDS—SPECIAL INSTRUCTIONS

#### INTRODUCTION

This section contains special instructions for the use of commercial-contractual statements, caveats, patents, trademarks, specific sources of supply, references to other organization, etc., in standards. When a standard contains any one of these statements or references, the committee shall obtain the necessary guidance from ASTM International Headquarters for the inclusion in the standard.

#### F1. Commercial-Contractual Items in Standards

F1.1 Certain requirements, such as those listed below, shall not be included in ASTM standards. If a committee feels it is important that this type of information be given, the committee may request an exemption from the Committee on Standards for the inclusion of such requirements in an ASTM standard.

- Adjustment, settlement, and investigation of claims
- Costs of testing, retesting statements
- Effective Dates
- Open-end agreements (see B1.2)
- Prices
- Purchasing

F1.2 The matter of who shall pay for services should be stated in the agreement or purchase order and not in the standard. Statements covering inspection (follow Section B19), rejection and rehearing (follow Section B20), testing and retesting (follow B16.2), marking (follow Section B22), and certification (follow Section B21) are suitable when they do not contain mandatory requirements covering the costs involved.

#### F2. Caveat Statements and Policies in Standards

F2.1 The generic caveat on *safety hazards* specified below shall appear in the Scope section of (1) test methods; (2) specifications where test methods are detailed other than by reference; and (3) practices and guides that involve the use of material, operations, or equipment.

This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

F2.1.1 When the standard does not involve the use of hazardous materials, operations, or equipment, a request for an exception to the inclusion of the generic caveat shall be presented to the ASTM Standing Committee on Standards.

F2.1.2 Specific *warning* statements shall be included in the standard (see Section A13 for the use of warning statements). These statements shall not prescribe specific remedial measures and actions. However, reference may be made to authoritative sources where reliable information concerning remedial measures can be obtained.

F2.1.3 Where there exists in a standard a specific warning statement(s), reference to the appropriate section(s) shall be made following the generic safety hazards caveat in the scope.

#### F2.2 Fire Standards:

F2.2.1 Every fire standard shall state its purpose, specify the known limitations of the standard, and specify the significance of the data that are generated (including relevance to human life and property, where appropriate). Use precise terminology (see Part E, Terminology in ASTM Standards), and include the appropriate caveat as listed below. Standards should include, when practical, sufficient background or explanatory material to guide users in properly applying ASTM fire standards.

F2.2.2 ASTM fire standards include fire-test-response standards, fire hazard assessment standards, and fire risk assessment standards.

Other types of fire standards shall also be permitted, including terminologies, guides, specifications, and practices. The following criteria shall be followed by fire standards:

F2.2.2.1 Fire-test-response standards provide a means for measuring the response of materials, products, or assemblies to heat and flame under controlled conditions of test. ASTM fire-test-response standards shall contain the following caveat:

This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products, or assemblies under actual fire conditions.

F2.2.2.2 Fire-hazard assessment standards provide a method for assessing the potential for harm for materials, products, or assemblies that could be anticipated under specified fire conditions. ASTM fire-hazard assessment standards shall contain the following statement:

This standard is used to predict or provide a quantitative measure of the fire hazard from a specified set of fire conditions involving specific materials, products, or assemblies. This assessment does not necessarily predict the hazard of actual fires which involve conditions other than those assumed in the analysis.

F2.2.2.3 Fire-risk assessment standards provide a method for assessing the probability of loss resulting from a given fire situation involving interaction between the material, product, or assembly with its environment. ASTM fire-risk assessment standards shall contain the following statement:

This standard is used to establish a means of combining the potential for harm in fire scenarios with the probabilities of occurrence of those scenarios. Assessment of fire risk using this standard depends upon many factors, including the manner in which the user selects scenarios and uses them to represent all scenarios relevant to the application. This standard cannot be used to assess fire risk if any specifications are different from those contained in the standard.

F2.2.2.4 ASTM develops fire standards other than fire-test-response standards, fire-hazard assessment standards, or fire-risk assessment standards, which provide information on fire issues that is not associated with a quantita-

tive output (where quantitative outputs include a binary pass/fail option or a classification into categories). Such ASTM fire standards shall contain the following statement:

This fire standard cannot be used to provide quantitative measures.

F2.2.2.5 The following generic caveat is appropriate for fire standards that do not describe a fire test but do produce quantitative results that are calculated measures of fire-test-response characteristics and not by themselves measures of fire hazard or fire risk.

This standard is used to determine certain fire-test responses of materials, products, or assemblies to heat and flame under controlled conditions by using results obtained from fire-test-response standards. The results obtained from using this standard do not by themselves constitute measures of fire hazard or fire risk.

F2.2.2.6 The following caveat is required for fire test methods:

Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.

*F2.2.3 Titles and Criteria for Fire-Hazard and Fire-Risk Assessment Standards*— All standards developed, approved, or reapproved for the analysis and control of fire hazard or fire risk shall contain the words “FIRE-HAZARD ASSESSMENT” or “FIRE-RISK ASSESSMENT” in the title. The results of all such assessments shall be expressed in terms that relate the item in question to the anticipated fire environment. When appropriate, the standard may also contain acceptance or classification criteria and a statistical sampling plan as a guide to its use.

F2.2.4 ASTM Committee E05 on Fire Standards is available to provide review of fire standards developed by other ASTM committees.

F2.3 *General Policy Caveat*— The Board of Directors approved the inclusion of a General Statement of ASTM Policy in all standards:

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing, you should make your views known to the ASTM Committee on Standards, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

This statement shall appear in a note at the end of the standard, following the note on ASTM Disclaimer of Liability as to Patented Inventions (see Section F3 on Patents in ASTM Standards).

**F2.4 Working Document Caveat—** The Board of Directors approved the use of the “Working Document” statement to be stated on the front page of every draft document or manuscript from a committee. The following statement shall be typed or stamped on the document:

This document is not an ASTM standard; it is under consideration within an ASTM technical committee but has not received all approvals required to become an ASTM standard. You agree not to reproduce or circulate or quote, in whole or in part, this document outside of ASTM Committee/Society activities, or submit it to any other organization or standards bodies (whether national, international, or other) except with the approval of the Chairman of the Committee having jurisdiction and the written authorization of the President of the Society. If you do not agree with these conditions, please immediately destroy all copies of the document. *Copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. All Rights Reserved.*

Anyone requesting an ASTM committee draft document is entitled to receive a copy. However, after receipt of this document, they shall adhere to the caveat.

**F2.5 Professional Judgment Caveat—** When a Technical Committee is developing a Standard Guide or Practice that may involve professional judgment, the following caveats may be used:

**Standard Guide—**This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project’s many unique aspects. The word “Standard” in the title of this document means only that the document has been approved through the ASTM consensus process.

**Standard Practice—**This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project’s many unique aspects. The word “Standard” in the title means only that the document has been approved through the ASTM consensus process.

**F2.6 Mercury Caveat—** When a standard includes reference to the element of mercury or products containing mercury, the following caveat shall appear in the Scope section.

*Warning—Mercury has been designated by many regulatory agencies as a hazardous substance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Safety Data Sheet (SDS) for additional information. Users should be aware that selling mercury and/or mercury containing products into your state or country may be prohibited by law.*

### F3. Patents in ASTM Standards

**F3.1** When a committee has determined an item covered by a patent or a pending patent may be necessary in a proposed standard, the committee shall include a statement in the balloting process and a footnote in the draft standard, indicating a willingness to consider alternative(s). ASTM standards submitted to ANSI for approval as American National Standards shall conform to the ANSI patent policy. The ANSI patent policy may be obtained on the ANSI website ([www.ansi.org](http://www.ansi.org)).

**F3.1.1 Statement in Balloting Process—** The statement with the ballot shall include a request for an alternative(s) as follows:

The (name of material, product, process, apparatus) is covered by a patent. If you are aware of an alternative(s) to the patented item, please attach to your ballot return a description of the alternatives. All suggestions will be considered by the committee. If alternatives are identified, the committee shall reconsider whether the patented item is necessary. The committee, in making its decision, shall follow Regulation 15.

**F3.1.2 *Statement in Footnote of Standard***—A footnote shall be included in the standard as follows:

The (name of material, product, process, apparatus and may include the patent number for reference) is covered by a patent. Interested parties are invited to submit information regarding the identification of an alternative(s) to this patented item to the ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

The footnote shall be cited in the specific section of the standard where the patented item is first mentioned. Information describing the patented item will be set forth once in the standard, in this footnote.

**F3.2 *Disclaimer of Liability as to Patented Inventions***—Neither ASTM International nor an ASTM committee shall be responsible for identifying all patents under which a license is required in using an ASTM document or for conducting inquiries into the legal validity of those patents which are brought to the Society's attention. Where applicable, an ASTM document shall include a note worded as follows:

"ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility."

#### **F4. Use of Trademarks and Specific Sources of Supply for Apparatus, Reagents, and Materials in ASTM Standards**

F4.1 ASTM International is authorized to certify products, equipment or services.

F4.1.1 ASTM International has a registered certification mark, along with other registered marks.

F4.1.2 ASTM International does not permit its trademarks to be used in a manner that suggests it has approved any product, equipment

or services other than in relation to an ASTM Certification Program.

F4.1.3 ASTM International does not permit the use of third-party trade- or service marks in ASTM standards in a manner that could suggest ASTM International's endorsement, approval, sponsorship, or certification of the trademarked item or service.

F4.1.4 Requiring participation in or that a product meet an ASTM Certification Program to comply with an ASTM standard is prohibited.

#### **F4.2 *Trademarks*:**

F4.2.1 Trademarks shall not be used in ASTM standards, unless the trademark is used to refer to a specific source of supply and such use conforms to the requirements of F4.3.

F4.2.2 Trademarks in ASTM standards shall not be used in a manner that: is false or misleading; violates the rights of the Mark's owner; violates any law, regulation or other public policy; or mischaracterizes the relationship between the Society and the material, product, system or service represented by the Mark, including but not limited to any use of a Mark that might reasonably be construed as an endorsement, approval, sponsorship, or certification by the Society of the material, product, system or service, or that might be reasonably construed as support or encouragement to purchase or utilize the material, product, system or service represented by the Mark. Judgment is at the sole discretion of the Committee on Standards.

F4.2.3 If ASTM International staff decides permission should be obtained to use a trademark, such permission shall be obtained by ASTM International Headquarters from the holder of the Mark.

F4.2.4 The first reference to the trademark in the standard shall include a footnote containing the name of the trademark holder. Trademark symbols shall not be included. "Trademark" shall be used as an adjective.

#### **F4.3 *Sources of Supply*:**

F4.3.1 To allow the widest possible use of ASTM standards, it is the responsibility of the sponsoring committee to ensure that sources of supply exist for unique or difficult-to-obtain apparatus, reagents, and materials.

F4.3.2 Reference to specific commercial sources of supply are permitted only when there is a sole source of supply.

F4.3.2.1 Information on the sole source of supply shall be included in a footnote. Include wording such as:

The sole source of supply of the apparatus known to the committee at this time is (name and address of the supplier). If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

F4.3.3 If the apparatus is not widely available, but more than one source of supply is known, or if apparatus that is widely available needs to be checked for suitability in the application specified, the committee can reference criteria for evaluating the apparatus. This reference can be to a section of the standard, to a separate existing standard or other published document, or can be in the form of an annex or appendix to the standard, or filed as an ASTM research report or adjunct.

F4.3.3.1 Text referencing the availability of such criteria, and any requirement on the use of such criteria, should be included in the appropriate section of the standard. Include wording such as:

All available apparatus may not be suitable for this application. Apparatus considered for use in this application shall be checked for suitability in accordance with the requirements of (insert reference to appropriate evaluation document).

## **F5. Reference to Standards of Other Organizations**

F5.1 When referencing standards of other organizations, include the designation and title for the document in the *Referenced Documents* sections.

F5.1.1 In all cases, information on the title, designation, and source availability of the reference standards shall be included. Do not include the year date of reference documents unless there is a technical reason for requiring a particular revision.

F5.2 When it is necessary to quote portions of a non-ASTM standard, permission to republish shall be obtained from the organization holding copyright by ASTM International Headquarters.

F5.3 Joint logos shall not be printed on ASTM standards, except with the authorization of the Board of Directors. When a standard has been developed in cooperation with another organization(s), a note may appear in the standard, crediting the other organization's participation.

F5.3.1 In cases of disagreement on implementation of this policy, the matter shall be referred to the Committee on Standards for decision.

## PART G

### STANDARDS STYLE MANUAL

#### G1. Styling

G1.1 Check the draft standard against the rules given in this style manual. Many technical committees have editorial subcommittees that review draft standards before submittal to Headquarters. The ASTM editorial staff does the final styling and is available to assist members. There are a number of forms of assistance available to the ASTM standards-writer, such as the following: on-line templates to write standards and access to the latest *Form and Style for ASTM Standards*, the *ASTM Online Dictionary of Engineering Science and Technology* (see [www.astm.org](http://www.astm.org)), *Committee White Papers* (supplements to this manual), and editorial workshops. Also, see the Introduction to this manual.

G1.2 Of the instructions that follow, some are included because they are deviations from the standard references, some because they are used frequently and are therefore listed here for convenience. Sections on various points of ASTM style appear in the following alphabetical order:

|  | Section |
|--|---------|
| Abbreviations and Unit Symbols                         | G3      |
| Alloy Designations                                     | G4      |
| And/Or   | G5      |
| Capitalization   | G6      |
| Chemical Formulas                                      | G7      |
| Contractual Parties                                    | G8      |
| Crystal Planes and Directions                          | G9      |
| Dictionaries and Other Reference Publications on Style | G10     |
| Dilution Ratio   | G11     |
| Figures  | G12     |
| Footnotes  | G13     |
| Hyphens  | G14     |
| Italics  | G15     |
| Mathematical Material                                  | G16     |
| Numbering  | G17     |
| Numerals   | G18     |
| Percent versus Percentage Points                       | G19     |
| Polymers   | G20     |
| References, Other Documents                            | G21     |
| References, Standards                                  | G22     |
| Sample versus Specimen                                 | G23     |
| SI Units   | G24     |
| Spelling   | G25     |
| Symbols  | G26     |
| Tables   | G27     |
| Tension/Compression/Flexure Tests                      | G28     |
| Thermal Conductivity                                   | G29     |
| Thermometers   | G30     |
| Trademarks   | G31     |

#### G2. Electronic Standard Preparation

G2.1 *Rationale for Ballot*— A rationale explaining the reason for the ballot is mandatory for all ballots.

G2.2 *New Standard*— For help in writing new standards, go to [www.astm.org](http://www.astm.org) and use the online draft standard templates.

G2.3 *Extensive Revision*— When doing an extensive revision, process in manuscript form. Submit entire document for ballot and do not use track changes as shown in G2.4 if the revisions would make the ballot too cumbersome to follow. In this case, the ballot rationale shall be used to state the extent of the changes and that the document should be reviewed in its entirety.

##### G2.4 *Minimum to Moderate Revisions*

G2.4.1 Clearly indicate what has changed by using the “track changes” tool. Follow these instructions to properly use the track changes tool:

G2.4.1.1 Only submit for ballot those sections that are being revised.

G2.4.1.2 Open the document and excerpt into a separate file only those sections to be revised.

G2.4.1.3 Select “Tools” from the pull-down menu.

G2.4.1.4 Select “Track Changes.” This will automatically default to underlining added text and striking through deleted text.

G2.4.1.5 Ensure that all changes (insertions, deletions, etc.) have been properly marked with the revision bar in the margins.

#### G3. Abbreviations and Unit Symbols

G3.1 In the text, use unit symbols after numbers denoting a definite quantity. Example: “The length is 25 mm [1.0 in].”

G3.2 Use unit symbols in tables and figures, and in lists defining symbols used in equations.

G3.3 Use unit symbols and abbreviations in the singular only. Thus “fifty kilograms” shall be designated “50 kg,” not “50 kgs.” Exceptions: Figs., Nos., Eqs., Refs, Vols.

G3.4 When a long word or phrase for which there is no standard abbreviations is used frequently, it may be replaced by an abbreviation that is explained when it first occurs. Examples: below top dead center (bt dc), relative centrifugal force (rcf).

G3.5 Commonly accepted abbreviations for names of societies, associations, government agencies, etc., may be used, provided the name is spelled out the first time it is used. Use no periods and run together. Examples: ASTM International, TAPPI, NASA, ARPA.

G3.6 The standard unit symbols and abbreviations for use in Society publications in the list below are so common that they may be used without explanation. For proper form and style for SI units follow IEEE/ASTM SI-10 American National Standard for Metric Practice, the SI Quick Reference Guide (Annex A) and Part G and Part H. If a discrepancy exists between these documents, follow Part G and Part H of the Form and Style Manual.

|                          |  |
|--------------------------|--|
| absolute                 | abs  |
| academic degrees         | use periods and run together (M.S., Ph.D., etc.) |
| alternating current      | ac   |
| American                 | Am. <sup>A</sup>                                 |
| American wire gauge      | AWG  |
| ampere                   | A  |
| ampere hour              | Ah   |
| angstrom                 | Å  |
| ante meridian            | a.m.   |
| Association              | Assn. <sup>B</sup>                               |
| atmosphere               | atm  |
| average                  | avg  |
| barrel                   | bbl  |
| becquerel                | Bq   |
| billion electronvolts    | (use GeV, gigaelectronvolts)                     |
| Birmingham wire gauge    | BWG  |
| brake horsepower         | bhp  |
| brake-horsepower hour    | bhp•h  |
| Brinell hardness number  | HB (see ASTM E10)                                |
| British thermal unit     | Btu  |
| Brown and Sharpe (gauge) | B&S  |
| bushel                   | Bu   |
| calorie                  | cal  |
| candela                  | cd   |
| centimetre               | cm   |
| centipoise               | cP   |
| centistokes              | cSt  |
| circular mil             | cmil   |
| coefficient              | <i>spell out</i>                                 |
| Company                  | Co. <sup>B</sup>                                 |
| Corporation              | Corp. <sup>B</sup>                               |
| coulomb                  | C  |
| cubic                    | use exponential form <sup>C</sup>                |
| cubic centimetre         | cm <sup>3</sup>                                  |

|   |   |
|---|---|
| cubic decimetre                                   | dm <sup>3</sup>                             |
| curie   | Ci  |
| cycles per minute                                 | cpm   |
| cycles per second                                 | (use Hz, hertz)                             |
| day   | <i>spell out</i>                            |
| decibel   | dB  |
| degree (angle)                                    |   |
| degree Celsius                                    | °C  |
| degree Fahrenheit                                 | °F  |
| degree Rankine                                    | °R  |
| degrees of freedom                                | df  |
| Department  | Dept. <sup>B</sup>                          |
| diameter  | dia (in figures and tables)                 |
| differential                                      | d   |
| direct current                                    | dc  |
| Division  | Div. <sup>B</sup>                           |
| dollar  | \$  |
| effective horsepower                              | ehp   |
| electromotive force                               | emf   |
| electronvolt                                      | eV  |
| Engineers   | Engrs. <sup>A</sup>                         |
| equation(s)                                       | Eq(s)                                       |
| farad   | F   |
| figure(s)   | Fig(s). <sup>D</sup>                        |
| foot  | ft  |
| footcandle  | fc  |
| foot pound-force                                  | ft•lbf (use for work, energy) (see lbf•ft)  |
| gallon  | gal   |
| gauss   | G   |
| gilbert   | Gb  |
| grain   | <i>spell out</i>                            |
| gram  | g   |
| gravity (acceleration)                            | g   |
| gray  | Gy  |
| half hard   | SH  |
| henry   | H   |
| hertz   | Hz  |
| horsepower  | hp  |
| horsepower hour                                   | hp•h  |
| hour  | h   |
| Hurter and Driffield scale (film density)         | H&D   |
| hydrogen ion concentration, negative logarithm of | pH  |
| inch  | in.   |
| inch of mercury                                   | in.Hg                                       |
| inch of water                                     | in.H <sub>2</sub> O                         |
| inch pound-force                                  | in•lbf (use for work, energy) (see lbf•in.) |
| inclusive   | incl (in figures and tables only)           |
| Incorporated                                      | Inc. <sup>B</sup>                           |
| indicated horsepower                              | ihp   |
| inside diameter                                   | ID (in figures and tables only)             |
| Institute   | Inst. <sup>B</sup>                          |
| integrated neutron flux                           | nvt, n/cm <sup>2</sup>                      |
| Iron pipe size                                    | IPS   |
| joule   | J   |
| K alpha radiation                                 | Ka  |
| kelvin  | K   |
| kilocalorie                                       | kcal  |
| kilocycle per second                              | (see note on cycles per second)             |
| kilogram  | kg  |
| kilogram-calorie                                  | kg•cal                                      |
| kilogram-force                                    | kgf   |
| kilogram metre                                    | kg•m  |
| kilometre   | km  |

## STANDARDS STYLE MANUAL

|                                |                                  |                                      |                                      |
|--------------------------------|----------------------------------|--------------------------------------|--------------------------------------|
| kilovolt                       | kV                               | month (When followed by a date       | <i>spell out</i>                     |
| kilovolt ampere                | kVA                              | use Jan., Feb., March, April,        |                                      |
| kiloelectronvolt               | keV                              | May, June, July, Aug., Sept.,        |                                      |
| kilovoltpeak                   | kVp                              | Oct., Nov., Dec. When there is       |                                      |
| kilowatt                       | kW                               | no date, spell out. Examples:        |                                      |
| kilowatthour                   | kWh                              | Jan. 15, 1995; January 1995)         |                                      |
| kip (1000 lbf)                 | <i>spell out</i>                 | nanometre (formerly millimi-         | nm                                   |
| kip (1000 lbf) per square inch | ksi                              | cron)                                |                                      |
| Knoop hardness number          | HK (see ASTM E384)               | National                             | Nat. <sup>A</sup>                    |
| lambert                        | L                                | newton                               | N                                    |
| linear                         | <i>spell out</i>                 | normal                               | N                                    |
| litre                          | L                                | number(s) (This abbreviation can     | No(s). <sup>D</sup>                  |
| logarithm (common)             | log                              | often be omitted entirely. It is     |                                      |
| logarithm (natural)            | ln                               | usually understood (as in <i>STP</i> |                                      |
| lumen                          | lm                               | 325, Specimen 8, Test 14,            |                                      |
| lux                            | lx                               | etc.))                               |                                      |
| magnetomotive force            | mmf                              | oersted                              | Oe                                   |
| mass-to-charge ratio           | <i>m/e</i>                       | ohm                                  | O                                    |
| maximum                        | max (in figures and tables       | ortho                                | <i>o</i>                             |
|                                | only)                            | ounce                                | oz                                   |
| maxwell                        | Mx                               | outside diameter                     | OD (in figures and tables only)      |
| median effective concentration | EC <sub>50</sub>                 | page                                 | p.                                   |
| median effective dose          | ED <sub>50</sub>                 | pages                                | pp.                                  |
| median lethal concentration    | LC <sub>50</sub>                 | para                                 | <i>p</i>                             |
| median lethal dose             | LD <sub>50</sub>                 | parts per billion                    | ppb                                  |
| megacycles per second          | (see note on cycles per second)  | parts per million                    | ppm                                  |
| megagram                       | Mg                               | pascal                               | Pa                                   |
| megawatt                       | MW                               | per                                  | use the diagonal line in expres-     |
| meta                           | <i>m</i>                         |                                      | sions with unit symbols <sup>E</sup> |
| metre                          | m                                | percent                              | %                                    |
| microampere                    | μA                               | pico (prefix)                        | p                                    |
| microcurie                     | μCi                              | picofarad                            | pF                                   |
| microfarad                     | μF                               | pint                                 | Pt                                   |
| microgram                      | μg                               | poise                                | P                                    |
| microhenry                     | μH                               | Poisson's ratio                      | μ (v is preferred in applied         |
| microinch                      | μin.                             |                                      | mechanics)                           |
| microlitre                     | μL                               | post meridian                        | p.m.                                 |
| micro-micro (prefix, use pico) | p                                | pound                                | lb                                   |
| micrometre (formerly micron)   | μm                               | pound-force                          | lbf                                  |
| microroentgen                  | μR                               | pound-force foot                     | lbf•ft (use for torque) (see         |
| microsecond                    | μs                               |                                      | ft•lbf)                              |
| microvolt                      | μV                               | pound-force inch                     | lbf•in. (use for torque) (see        |
| microwatt                      | μW                               |                                      | in•lbf)                              |
| mil                            | <i>spell out</i>                 | pound-force per square foot          | lbf/ft <sup>2</sup>                  |
| mile                           | <i>spell out</i>                 | pound-force per square inch          | psi or lbf/in. <sup>2</sup>          |
| miles per hour                 | mph                              | pound-force per square inch          | psia                                 |
| milliampere                    | mA                               | absolute                             |                                      |
| milli-angstrom                 | mA                               | pound-force per square inch          | psig                                 |
| millicurie                     | mCi                              | gauge                                |                                      |
| milliequivalent                | meq                              | quart                                | qt                                   |
| milligram                      | mg                               | rad (dose unit)                      | rd                                   |
| millihenry                     | mH                               | radian                               | rad                                  |
| millilitre                     | mL                               | radio frequency, <i>n</i>            | rf                                   |
| millimetre                     | mm                               | radio frequency, <i>adj</i>          | r-f                                  |
| millimetre of mercury          | mmHg                             | radius                               | R (in figures and tables only)       |
| million electronvolts          | MeV                              | Railway                              | Ry. <sup>B</sup>                     |
| milliroentgen                  | mR                               | Railroad                             | R.R. <sup>B</sup>                    |
| millisecond                    | ms                               | reference(s)                         | Ref(s)                               |
| millivolt                      | mV                               | relative humidity                    | RH (in figures and tables only)      |
| milliwatt                      | mW                               | revolution per minute                | r/min                                |
| minimum                        | min (in figures and tables only) | revolution per second                | r/s                                  |
| minute                         | min (spell out when used with    | Rockwell hardness, C scale           | HRC (see ASTM E18)                   |
|                                | minimum)                         | roentgen                             | R                                    |
| molal                          | <i>spell out</i>                 | root mean square                     | rms                                  |
| molar                          | <i>M</i>                         | Saybolt Furol seconds                | SFS                                  |
| mole                           | mol                              | Saybold Universal seconds            | SUS                                  |
|                                |                                  | second                               | s                                    |

|   |   |
|---|---|
| secondary                                 | <i>sec</i>  |
| siemens                                   | S   |
| Society                                   | Soc. <sup>B</sup>                                       |
| socket joint (tables and drawings only)   | Sj  |
| specific gravity                          | sp gr   |
| square                                    | use exponential form (exception: psi, ksi) <sup>C</sup> |
| standard taper (tables and drawings only) | TS  |
| steradian                                 | sr  |
| stokes                                    | St  |
| tensile strength                          | <i>spell out</i>  |
| tertiary                                  | <i>tert</i>   |
| tesla                                     | T   |
| thousand electronvolts                    | KeV   |
| thousand pounds                           | kip   |
| thousand pounds-force per square inch     | ksi   |
| ton                                       | <i>spell out</i>  |
| torr                                      | <i>spell out</i>  |
| United States, <i>n</i>                   | <i>spell out</i>  |
| United States, <i>adj</i>                 | U.S.  |
| United States Pharmacopeia                | USP   |
| versus                                    | <i>spell out</i>  |
| Vickers hardness number                   | HV (see ASTM E384)                                      |
| volt                                      | V   |
| volume (of a publication)                 | Vol <sup>D</sup>  |
| watt                                      | W   |
| watt hour                                 | W•h   |
| weber                                     | Wb  |
| week                                      | <i>spell out</i>  |
| yard                                      | yd  |
| year                                      | <i>spell out</i>  |
| Young's modulus                           | E   |

<sup>A</sup> In footnotes and references only.

<sup>B</sup> At end of name only.

<sup>C</sup> With unit symbols only.

<sup>D</sup> Only when followed by a number.

<sup>E</sup> Exceptions: cpm, mph, psi.

## G4. Alloy Designations

G4.1 Use the following for alloy designations:

3135 steel  
 2024-T4 aluminum  
 Ti-4Al-3V-Mo  
 Ti-6Al-4V  
 0.5Ti molybdenum alloy or molybdenum with 0.5 % titanium or  
 0.5Ti alloy (where molybdenum is understood)

G4.2 ASTM and SAE have jointly developed a unified numbering system (UNS) for alloy identification (Practice E527).

## G5. And/Or

G5.1 Do not use this expression. For example, when “A and/or B” is truly the case, write “A or B, or both.” For example, when “A,

B, and/or C” is truly the case, write “A, B, or C, or combinations thereof.”

## G6. Capitalization

G6.1 Use capitals sparingly.

G6.2 In headings and titles, capitalize all nouns, pronouns, verbs, adjectives, adverbs, and all other words of five or more letters. Do not use initial caps on abbreviations (except see G6.6), or the phrase “et al.” or in the word “to” in the infinitive form of a verb.

G6.3 Use initial cap for “committee” where used in a title, as “Committee A01,” “Committee on Publications.” Everywhere else use lowercase, as “The committee recommends ...” This rule also applies to use of “symposium,” etc.

G6.4 Use initial cap on Society, Staff, and Headquarters when referring to ASTM International, its Staff, and its Headquarters.

G6.5 Capitalize trademarks. The initial cap becomes lowercase after the word is accepted into the language as generic. When in doubt, capitalize. The following are now lowercase: babbitt, bunsen, cellophane, diesel, kraft, neoprene, nylon, portland cement, saran.

G6.6 Use initial cap in referring to volumes, figures, tables, etc., as Vol 2, Fig. 2, Table 2. Use lowercase in less direct references such as: “This volume contains ...,” “In the same figure is shown ...”

G6.7 Use initial caps in such expressions as: Test 1, Specimen A, Cement B, Type 1, Class C, Grade B, etc.

G6.8 It is permissible to use all caps in directions such as: “Turn the machine to OFF position” or “Turn the dial to TITRATE.”

## G7. Chemical Formulas

G7.1 Chemical formulas should be used freely in tables and figures. In text in which chemical formulas are mentioned infrequently, spell out the names. Where they are mentioned frequently, spell out the name in the first reference to it, followed by the formula in parentheses. The formula alone may be used subsequently. Do not use chemical formulas for organic or complex inorganic compounds. Always spell out the word

“water” and the name of the elements (use lead, not Pb). Isotopes may be written as carbon-14 or as  $^{14}\text{C}$ .

## G8. Contractual Parties

G8.1 Terms describing contractual parties shall be limited to the following:

G8.1.1 *Party of First Part*, producer, supplier, seller, or manufacturer.

G8.1.2 *Party of Second Part*, purchaser or user.

## G9. Crystal Planes and Directions

G9.1 Use the following symbols for crystallographic planes and directions:

plane (111)

family of planes {111}

direction [111]

family of directions  $\langle 111 \rangle$

## G10. Dictionaries and Other Reference Publications on Style

G10.1 For spelling, punctuation, capitalization, and foreign words, use a reference source material, such as *Merriam-Webster's Collegiate Dictionary* or *Webster's Third New International Dictionary* (print or electronic versions). For other information on style use *Manual of Style*, The University of Chicago Press (print or electronic version).

## G11. Dilution Ratio

G11.1 Use the form “9+1” rather than “9:1” for dilution ratios. This means that the 1 part solute is to be mixed with the 9 parts solvent. Specify whether volumes or weights are being used, for example, volume/volume, weight/volume, etc.

## G12. Creating and Submitting Figures for Ballot

G12.1 *Definition*—A figure can be a technical drawing (vector line art), information visual (chart/graph/schematic), or a photograph, or a combination of these.

G12.2 Please include figure(s) with your ballot submission to ensure timely publication of your standards.

G12.2.1 Size each figure up to 30 picas in width (approximately 125 mm or 5 in.) This is the maximum.

G12.3 *How do I create and save non-photographic images (for example, graphs, drawings, schematics) or digital photographs from a hard copy original or from computer-generated artwork?*

G12.3.1 Keep in mind that the larger the original, the greater potential for a better reproduction.

G12.3.2 Size each figure to 30 picas in width (approximately 5 in.). For full-page/landscape figures, size to 42 picas in width (approximately 7 in.). These are the maximum allowable widths.

G12.3.3 When taking digital photographs, use the highest resolution possible on the camera. Absolute minimum resolution is  $1200 \times 960$  pixels.  $1936 \times 1296$  pixels is better, and  $2896 \times 1944$  pixels is even better.

G12.3.4 Check the image quality and the brightness and contrast levels.

G12.3.5 Submit artwork in its original file source/extension. ASTM graphic designers can work with most file formats, including CAD. (SVG, EPS, or AI files are preferred for technical drawings. TIFF or JPG preferred for photographs or halftones. GIF is discouraged as a generally low-resolution file type.)

G12.3.6 If you need to scan hard copy, adjust the resolution on your scanner as follows:

G12.3.6.1 Technical drawing or other information visual FTP—Please scan the line art at 1200 dpi (dots per inch).

G12.3.6.2 Photograph FTP—Please scan at 600 DPI. If the image is to be enlarged, increase the percentage of the scanned image.

G12.3.6.3 ASTM can also scan for you (see G12.5).

G12.3.7 Furnish short titles or captions for each figure.

G12.4 *How do I submit the file?*

G12.4.1 **E-mail** your staff manager or editor.

G12.4.2 **FTP**—Please contact the ASTM Help Desk for assistance at 1-800-262-1373.

G12.4.3 **DVD/CD-ROM**

G12.4.4 *Hard copy can be mailed to ASTM Headquarters, in case ASTM cannot use the electronic file. See the following instructions.*

G12.5 *How do I submit hard copy?*

G12.5.1 Provide camera-ready figures of professional quality, because the printer will scan what is submitted, and it will appear in the standard exactly as you have supplied it. To this end:

G12.5.1.1 Use a laser or other high-quality printer.

G12.5.1.2 Do not handwrite on the figure.

G12.5.1.3 Do not use a faxed or photocopied figure.

G12.5.1.4 Furnish short titles or captions for each figure.

### G13. Footnotes

G13.1 For footnotes in tables, use superior italic capital letters, beginning anew for each table. Type the footnotes below the table.

G13.2 For all other footnotes, use superior numbers.

G13.3 Do not use footnotes in figure captions. Either cite a previous footnote or reference (for example, “see Footnote 3,” or “taken from Ref (4)”), or write out the reference in the caption. For style of publication footnotes, see Sections G21 and G22.

### G14. Hyphens

G14.1 In ASTM standards, hyphenate compound adjectives, such as: “low-alloy steel,” “cold-drawn wire.” Compound adjectives involving SI units should use a space, such as: “50 mm gauge.” Write expressions such as the following *with* the hyphen after the first word: “high- and low-temperature tests.” For the sake of appearance, omit hyphens in such expressions as “3 % nickel alloy” or “3EC rise in temperature.” Also do not hyphenate chemical compounds and the words “stainless steel” and “cast iron.”

G14.2 Do not hyphenate an adverb-adjective combination when the adverb ends with “ly.”

G14.3 Spelled-out fractions used as nouns are not hyphenated (one third of the load); used as adjectives, they *are* hyphenated (a one-third share).

### G15. Italics

G15.1 *Italicize:*

G15.1.1 All symbols for physical quantities that can have a numerical value (quantity symbols).

G15.1.2 Letters in parentheses used to identify listings in text or subdivisions of illustrations, “Fig. 1(a).”

G15.1.3 *Chemistry*— *N* (normal), *M* (molar), *c* (concentration). Do not italicize symbols for the elements (Fe, N, Na, etc.) Exception: italicize *N* for nitrogen when it is used to denote position, as in *N*-methylaniline. Italicize *o*, *m*, and *p* as ortho, meta, and para; for example, *p*-cresol. Italicize and abbreviate secondary and tertiary as *sec* and *tert*; for example, *tert*-butyl alcohol. Italicize *iso* when used in *isooctane*.

G15.1.4 *Titles*— of books, including ASTM books, such as *Annual Book of ASTM Standards* and *ASTM STP 379*.

G15.1.5 *Foreign Words*— Use a reference source material, such as *Merriam-Webster’s Collegiate Dictionary* or *Webster’s Third New International Dictionary* (print or electronic version) as a guide to foreign words.

G15.1.6 *Transistor Type*— Use *n-p-n*, *p-n-p*, *n-type*, etc.

G15.2 *Do not italicize:*

G15.2.1 Letters used to subdivide a categorical classification, such as Method A, Cement B, Class C, Grade D, Type E, Sample F.

G15.2.2 *Metallurgy*—  $A_1$  point,  $A_{11}$ , etc.

G15.2.3 *Abbreviations*— pH, sin, cos, tan, log, d (for derivative).

### G16. Mathematical Material

G16.1 Mathematical material can appear in the standard text or as equations. In all cases, submit clear copy, without ambiguities arising from carelessly placed subscripts or superscripts, confusion between Greek and Roman letters, incomplete fraction lines, and so on. When there

is a possibility of confusion (for example capital letter O and zero), include an editorial note nearby to clarify with more description. For example:

$$1 = 1 \times 10^3 \mu\text{m}$$

Editorial Note: Lowercase “L” equals number one times 10 superscript 3 Greek mu

**G16.2 Greek Symbols**— If unclear, type out the name of the Greek symbol in an editorial note.

**G16.3 Superscripts** (superior symbols) should be marked with a caret or type “super-script” in an editorial note. Subscripts (inferior symbols) should be marked with an inverted caret or type “subscript” in an editorial note.

**G16.4** Indicate what symbol is preferred to show multiplication (for example, times symbol, middle dot, or asterisk).

**G16.5 Equations**— Type on a separate line in a larger font. Equations are numbered throughout the text. The format for a numbered equation is:

$$S = \frac{Mc}{I}$$

where:

$S$ = stress, psi or Pa,

$M$ = bending moment, lbf•in. or N•m,

$c$ = distance from neutral axis to outermost fiber, in., or m, and

$I$ = second moment of area, in.<sup>4</sup> or m<sup>4</sup>.

**G16.6 Exp versus e**— If the exponent is relatively short and on one line, without superscripts or subscripts, use e:

$$e^{(a-b)cx}$$

If it is relatively long or has superscripts or subscripts, use exp:

$$\exp[x^2/2 - \ln(x/a)]$$

**G16.7 Fractions**— Use the solidus (diagonal line) in the text:

1/4

Use the built-up fraction (with a horizontal line) in an equation. If you use a built-up fraction on one side of an equation, use it on the other side:

$$\frac{a}{b} = \frac{c-d}{e-f_2} \times 12$$

Use parentheses liberally to clearly show the complete numerator or denominator. For example, does log  $a/b$  mean log ( $a/b$ ) or (log  $a$ )/ $b$ ? Use the parentheses to clarify. If you write  $a/b + c$  but mean  $a/(b + c)$ , use parentheses.

**G16.8 Statistical Data**— For data that are treated statistically, follow the recommendations in the *ASTM Manual on Presentation of Data and Control Chart Analysis (MNL7)*. Committee E11 on Quality and Statistics, which is responsible for MNL7, is prepared to cooperate with other technical committees in helping them present data most effectively. In particular:

**G16.8.1** To present the essential information contained in a set of observations from one population, give the average, the standard deviation or coefficient of variation, and the number of observations.

**G16.8.2** Whenever you give an average, give also the number of observations on which the average is based.

**G16.8.3** Use the following symbols, where needed:

$\bar{x}$  = average (arithmetic mean)

$s$  = root-mean square deviation

$n$  = number of observations

$s$  = standard deviation

$v$  = coefficient of variation

## G17. Numbering

G17.1 See Part D.

## G18. Numerals

**G18.1** Use arabic numerals in designating figures and tables, thus: “Fig. 3,” “Table 6.”

**G18.2** Spell out all numbers from one through twelve, with the following exceptions:

**G18.2.1** Use numerals when the quantity is partly fractional, as: 1.15, 1½.

G18.2.2 Use numerals when followed by an expression having a standard unit symbol, as: 25 mm, 45 kg, 9 %.

G18.2.3 If for any reason the standard abbreviation or unit symbol of the expression following the number is not used, or if the expression does not admit of abbreviation (as *year*, *ton*, etc.), the use of numerals is optional, unless covered in the following paragraphs:

G18.2.4 In statements containing two or more numbers, one of which is greater than twelve, express all numbers as numerals, such as “2 tests and 16 weighings.”

G18.2.5 In a series of connected numerical statements implying precision, use numerals, as “5 months, 3 days.”

G18.2.6 Use numerals after abbreviations, as: Vol 26, Fig. 2.

G18.3 Use numerals for all numbers exceeding twelve, with the following exceptions:

G18.3.1 Do not begin a sentence with a numeral. When the numeral is spelled out, also spell out the unit following, as “One gram is usually sufficient.”

G18.3.2 Spell out round numbers used in an indefinite sense, such as, “a *hundred* metres or so.”

G18.3.3 Spell out numbers when used in the following manner: “*fifteen* 25 mm rods” (or 15 twenty-five millimetre rods).

G18.3.4 In decimal numbers having no units, place a zero before the decimal point, as: “0.65 mm,” not “.65 mm.”

G18.4 In pointing off numbers of more than four figures, use spaces instead of commas in the text, illustrations, and tabular matter (1 234 567). Do not point off numbers of four figures (1234) except in tables when they occur in a column containing numbers of more than four figures.

G18.5 In expressing ratios (except dilution ratios) use 1 to 10 or 1:10, not 1-10.

G18.6 In expressing grades of, for example, emery paper, use 3/0, not 000.

## G19. Percent versus Percentage Points

G19.1 When a quantity is reduced from 40 to 30, it is reduced by 25 %. When a quantity decreases from 40 % to 30 %, it decreases by 10

*percentage points*. Use the forms “mass percent,” “volume percent,” “atom percent,” etc.

## G20. Polymers

G20.1 Where the name of the monomer is one word, the prefix “poly” is simply run in, as: polystyrene, polyisobutylene, etc. Where the name of the monomer is two words, they are enclosed in parentheses and the prefix “poly” added, as in the following words: poly(vinyl chloride), poly(methyl methacrylate).

## G21. References, Other Documents

G21.1 If there are fewer than five references cited in the standard, use footnotes. If five or more references are cited, type them in a separate list of references at the end of the manuscript, following annexes and appendixes, if any. Assign a consecutive arabic number to each reference. Indicate the reference in the text by enclosing the number in parentheses and using boldface. Show a footnote reference after the first boldface reference number, stating in the footnote: “The boldface numbers in parentheses refer to the list of references at the end of this standard.” If it is necessary to use the word “reference,” use the style: “According to Ref (**3**) ...” It is preferable, however, to use the author’s name, as “According to Jones (**3**) ...” If there are two authors, use both names, as: “According to Jones and Smith (**3**)...” If there are three or more authors, use “et al,” as: According to Jones et al (**3**) ...”

G21.2 Do not list ASTM standards as references; list them in the section on Referenced Documents (see also Section A6). Do not list as references documents that are not readily accessible to the reader, such as unpublished theses and private correspondence.

G21.3 Type references (and publication footnotes) as follows:

G21.3.1 *Books*— Type author’s name or names (initials last), complete title of book (italic, no quotation marks), name of publisher (no abbreviations), address of publisher (city and state), year of publication, and page number, if reference is to a page number. Example:

Jones, J. J., *Plasticity and Creep*, John Wiley & Sons, Inc., New York, NY, 1958, p. 250.

G21.3.2 *Magazines, Journals* (including *Standardization News*)— Type author's name or names (initials last), title of paper (in quotation marks), complete title of journal (italic, no quotation marks), volume number, issue number (this may be omitted if the journal page numbers are continuous throughout the volume), date of publication, and page numbers. Example:

Jones, J. J., and Smith, R. R., "Correlation of Brinell Hardness and Tensile Strength," *Materials in Design Engineering*, Vol 10, No. 2, February 1958, pp. 52-67.

G21.3.3 *Proceedings, Transactions, Reports, Bulletins, etc.*— Type author's name or names (initials last), complete title of paper (in quotation marks), name of publication (italic, no quotation marks), name of publisher, volume number, if any, date of publication, and page numbers. Examples:

Jones, J. J., "Lubrication Problems in Space Vehicles," *Transactions*, American Society of Mechanical Engineers., Vol 52, 1948, pp. 135-140.

Jones, J. J., "Classification of Bitumens," *Journal of the Institute of Petroleum*, Vol 38, 1952, p. 121.

Jones, J. J., "Fatigue of Aircraft Structures," *NASA TR-108*, National Aeronautics and Space Administration, 1959.

Jones, J. J., "Effect of Carbon Content on Notch Properties of Aircraft Steels," *Bulletin 642*, Engineering Experiment Station, University of Illinois, 1957.

G21.3.4 *Symposium Volumes or Other Books Comprising Collections of Papers*— Follow style for books in G21.3.1 and add title of paper, in quotes, after author's name.

G21.3.5 *Patents*— Type patent number and date. Example: U.S. Patent No. 2 232 185, Feb. 18, 1941.

G21.3.6 *Annual Book of ASTM Standards*— Cite referenced ASTM standards in section on Referenced Documents, not in references (see Section G22).

G21.3.7 *ASTM Proceedings*— McVetty, P.G., "The Interpretation of Creep Tests," *Proceedings*, ASTM International, Vol 34, Part II, 1934, p. 105. (Volume 38 was the last to be issued in two parts.)

G21.3.8 *ASTM Special Technical Publication:*

G21.3.8.1 *Whole Book:*

*Symposium on Synthetic Bioabsorbable Polymers for Implants. ASTM STP 1396*, ASTM International, 2000.

G21.3.8.2 *Single Paper:*

Gorna, K., and Gogolewski, S., "Novel Biodegradable Polyurethanes for Medical Applications," *Symposium on Synthetic Bioabsorbable Polymers for Implants, ASTM STP 1396*, ASTM International, 2000, p. 39.

G21.3.8.3 *Journal Reference to Website:*

Name of Author(s), "Name of Paper," *Title of Journal*, Volume, Number, Issue Number, Paper Identification Number, Online, Available: URL, Access Date.

Example:

Aydilek, A. H. and Edil, T. B., "Evaluation of Woven Geotextile Pore Structure Parameters Using Image Analysis," *Geotechnical Testing Journal*, Vol. 27, No.1, ID GTJ111070, Online, Available: [www.astm.org](http://www.astm.org), 12 January 2004.

## G22. References, Standards

G22.1 Refer to ASTM standards first in the section on Referenced Documents. Follow the designation (without year) with the full title, and use a footnote to refer to the appropriate publication. The footnote should read: For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org) or contact ASTM Customer Service at [Service@astm.org](mailto:Service@astm.org). For the *Annual Book of ASTM standards* volume information, refer the standard's Document Summary page on the ASTM website. Thereafter use simply the abbreviated designation (Test Method D1708, Practice E691, Specification A250/A250M, etc.) Do not include the word "Standard." Do not use quotes on titles of standards, whether those of ASTM International or other organizations.

G22.2 Any reference to a combined standard shall include the entire designation, for example, Specification A36/A36M. When only one system of units is applicable, this may be indicated where the reference is cited; for example:

This material shall conform to the general requirements stated in SI units of Specification A36/A36M.

G22.3 Do not refer to a specific paragraph, section, table, or figure of another standard unless necessary to avoid confusion. For example, say, “the section on Impregnation Time of Methods D202.”

### G23. Sample versus Specimen

G23.1 In general, the word “sample” should be used only to describe a piece or quantity of bulk material that has been selected by some sampling process. Pieces or quantities taken from the sample for testing are called “specimens.” Quantities of liquid or bulk aggregate are usually called “samples,” because a sampling procedure is usually used to obtain them.

G23.2 To describe the piece on which a test is made, use “specimen” or “test specimen,” not “piece” or “sample.”

### G24. SI Units

G24.1 SI units shall be included in all ASTM standards in accordance with IEEE/ASTM SI-10, the SI Quick Reference Guide (Annex A) and Part G and Part H. If a discrepancy exists between these documents, follow Part G and Part H of the Form and Style Manual.

G24.2 Combined Standards—Both units of measure are included, and either system is to be regarded separately as the standard. The combined designation format: A36/A36M. (See also A3.4.)

### G25. Spelling

G25.1 Included in the following list are those spellings of words commonly found in ASTM standards. For words that do not appear in this list, use a reference source material. *See Section G10 on Dictionaries and Other Reference Publications on Style.* Use international spelling for SI units; that is, litre and metre.

#### A

airborne  
alignment  
appendixes (pl)

#### B

babbitt metal (lc)  
Brinell (cap)

#### C

catalog (not catalogue)  
CODEN

#### D

Disk  
disc (CD)  
Diskette (Floppy)  
drier (comp. of dry)  
dryer (apparatus)

#### E

ensure (meaning be sure)  
et al.  
eutectic (noun)  
eutectoid (adj.)

#### F

fireclay (adj.)

#### G

gastight  
gauge (measurement, instrument)  
Geiger-Muehller tube  
gray (not grey)

#### H

heat treat (verb)  
heat-treated (adj.)  
Hooke’s law (lc “l”)

#### I

indexes (pl)  
in situ (roman)  
insofar  
isooctane (all other “iso’s” roman)

#### K

kerosine/kerosene

#### L

litre (not liter)

**M**

magnetic particle inspection (not Magnaflux)  
 metre (not meter)  
 microscopic (meaning very small)  
 microscopical (meaning pertaining to use of a microscope)

**N**

neoprene (lc)  
 nital (lc)  
 nitrile rubber (butadiene) (lc)  
 Normal Law integral (cap N and L)

**P**

pipet (not pipette)  
 plaster of paris (not plaster of Paris)

**R**

Rockwell (cap)

**S**

sigma phase (spell out sigma)  
 siliceous  
 SR-4 strain gage  
 Stokes' law (lc "l")

**U**

Usage

**V**

V-Notch (noun and adj.)

**X**

X ray (noun)  
 X-ray (adj and verb)

**G26. Symbols**

G26.1 In general, avoid the use of symbols in text except in accordance with Sections G3 and G7. When stating dimensions, use "by" not  $\times$ , for example, "10 by 5 in. (254 by 127 mm)." Show tolerances, for example, as 10 by  $5 \pm 2$  in. (254 by  $127 \pm 6$  mm)." Do not use a hyphen or a dash for the word "to" except in tables where needed to conserve space. Do not use (') or (") for feet and inches in text, tables, or figures.

G26.2 In combination with words not having symbols, spell out entirely, for example, "bubbles per minute."

**G27. Tables**

G27.1 Number each table with an arabic numeral and give it a title that is complete and descriptive.

G27.2 In column headings, first include the quantity being tabulated, then a comma, then the units, for example:

"Tensile Strength, min, psi."

G27.3 *Powers of 10*— Do not use powers of 10 in the column heading, since it is not clear whether the numbers in the table have been or are to be multiplied by the power of ten. Instead, indicate the multiplication (for example,  $1.45 \times 10^6$ ) in the first entry in the table; or use an expression such as "Young's Modulus, millions of psi" in the column heading.

G27.4 *Footnotes*— See G13.1.

G27.5 Use horizontal rules under column headings. Use vertical rules only when the complexity of the table demands them for clarity. Use leaders (three periods) in any space that represents a blank entry.

G27.6 *Notes*— Additional information can be included in a note that appears below the title.

G27.7 When two (or more) separate systems of units are both listed in one table (for example, SI and inch-pound units), separate the units by using separate columns, or parentheses, or brackets.

G27.7.1 When the size of a table and limitations of space (on the printed page) make it impractical to expand the table to include SI unit equivalents, duplicate the table.

G27.7.2 When following the instructions given in G27.7 or G27.7.1 is impractical, because of the size and the number of tables, include the pertinent conversion factors as footnotes under each table instead of attempting to include the actual converted numbers themselves.

**G28. Tension/Compression/Flexure Tests**

G28.1 The words "tension," "compression," and "flexure" are used adjectivally to modify "specimen," "test," or "testing." Examples: tension test, compression testing, flexure specimen. To modify other nouns, the adjectives "tensile,"

“compressive,” and “flexural” are used. Examples: tensile strength, compressive force, flexural data.

G28.2 In some areas (notably the textile industry) there is a difference between a “tension test” and a “tensile test,” and in these cases the appropriate terminology shall be used.

## G29. Thermal Conductivity

G29.1 The form to be used for the unit for thermal conductivity  $k$  is: Btu•in./h•ft<sup>2</sup>• F[SI units: W/(m•K)].

## G30. Thermometers

G30.1 Whenever possible, refer to thermometers described in ASTM Specification E1 or E2251, for ASTM Thermometers. Reference to an ASTM thermometer of the desired range should be as follows:

Thermometer—ASTM (name) Thermometer having a range from \_\_\_\_ to \_\_\_\_ (°C or °F, whichever applies) and conforming to the requirements for Thermometer (give thermometer number; for example, 16F) as prescribed in Specification (E1 or E2251, whichever applies).

G30.2 Do not specify both temperature scales unless there is a definite need for them.

## G31. Trademarks

G31.1 Avoid the use of trademarks whenever possible. For example, use aluminum oxide instead of Aloxite, petroleum jelly instead of Vaseline. When trademarks are used, they should, of course, be initial cap and the owner of the

trademark indicated by footnote.

Aloxite (trademark, use aluminum oxide)

Alundum (trademark)

Bakelite (trademark)

Carborundum (trademark)

Celite (trademark)

Chromel-Alumel (trademark)

Haydite (trademark)

Inconel (trademark)

Invar (trademark)

Kel-F (trademark, use polychlorotrifluoroethylene)

Lucite (trademark, use poly(methyl methacrylate) (PMMA))

Magne-Gage (trademark)

Masonite (trademark)

Monel metal (trademark)

Muntz metal (trademark)

Mylar (trademark, use polyester film)

Nichrome (trademark)

Nujol (trademark, use light mineral oil)

Plexiglas (trademark, use poly(methyl methacrylate) (PMMA))

Pyrex (trademark, use borosilicate)

Scotch tape (trademark, use pressure-sensitive tape)

Teflon (trademark, use TFE-fluorocarbon or polytetrafluoroethylene (PTFE))

Thiokol (trademark, use as an adjective, as “Thiokol polysulfide rubber”)

Transite (trademark)

Tygon (trademark, use vinyl)

Vaseline (trademark, use petroleum jelly)

Vycor (trademark, use high-silica)

## PART H

### USE OF SI UNITS IN ASTM STANDARDS

#### H1. Scope

H1.1 This part is intended to guide technical committees in the use of the standard formats for denoting the use of the International System of Units (SI), non-SI units (usually inch-pound), or both in ASTM standards.

H1.2 SI units of measurement shall be included in all ASTM standards.

H1.2.1 Each technical committee shall have the option of using rationalized SI units, or rationalized inch-pound units, or both, as the standard units of measure.

DISCUSSION—Given ASTM's mission to be the foremost developer and provider of voluntary consensus standards with global recognition and use, ASTM technical committees are urged to give diligent consideration to the use of rationalized SI (metric) units in their standards

H1.2.2 Follow the procedures given in IEEE/ASTM SI-10, the SI Quick Reference Guide and Part G and Part H. If a discrepancy exists between these documents, follow Part G and Part H. IEEE/ASTM SI-10 appears in the *Annual Book of ASTM Standards*, and is also available as a separate publication.

H1.2.2.1 For committees that have special considerations with the use of SI units in ASTM Standards, it is permissible to develop committee specific technical guidance for clarification. Examples of such documents are as follows:

ASTM Committee B05 on Copper and Copper Alloys  
Outline of Form of Specifications  
([www.astm.org/COMMIT/B05\\_outline.pdf](http://www.astm.org/COMMIT/B05_outline.pdf))  
A994 Guide for Editorial Procedures and Form of  
Product Specifications for Steel, Stainless Steel, and  
Related Alloys

#### H2. Terminology

H2.1 *SI unit, n, in ASTM standards*— unit of the International System of Units (SI) and other units specifically approved in IEEE/ASTM SI-10 as a unit for use with SI.

H2.2 *inch-pound unit, n, in ASTM standards*— unit based on the inch and the pound, commonly used in the United States of America and defined by the National Institute of Standards

and Technology, including certain other units accepted for use with these units.

DISCUSSION—Inch-pound, also known as U.S. Customary Units, are one type of non-SI units. Another example of non-SI units is the centimetre gram second (cgs) system.

H2.3 *rationalization, n, in ASTM standards*— (formerly *hard conversion*) the planned simplification of a converted value achieved by modifying the value to reflect dimensions or physical characteristics of existing real measurements or configurations; as a result of this change the object or quantity may not be interchangeable with the original.

H2.4 *SI standard, n, in ASTM standards*— a standard that contains rationalized SI units of measurement.

DISCUSSION—There are two formats of SI standards: solely SI, combined standard.

H2.4.1 *Solely SI standard, n*— an ASTM standard in which only rationalized SI units are cited; inch-pound units are not provided in the standard.

H2.4.2 *combined standard, n*— an ASTM standard in which rationalized SI units and inch-pound units are included in the same standard, with each system of units to be regarded separately as standard. (For example, Specification A36/A36M).

#### H3. Format Requirements for Standards in SI Units

H3.1 For a standard citing SI units of measurement as the standard units of measurement, select the type of SI standard to be written and follow the appropriate format requirement listed below:

H3.1.1 *Solely SI Standards:*

H3.1.1.1 *Scope*— Include the following in the scope as a numbered paragraph:

1.X Units—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

H3.1.1.2 *Units*— Within the text, show only rationalized SI units.

H3.1.2 *Combined Standards*:

H3.1.2.1 *Scope*— Include the following in the scope as a numbered paragraph:

1.X Units—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

H3.1.2.2 *Units*— Within the text, it is recommended that SI units appear first followed by the inch-pound units in brackets. However, a technical committee can opt to reverse the order in which the units appear (i.e., inch-pound units shown first, followed by SI units in brackets) if the following additional conditions are met: all units appear in a consistent order throughout the text of the standard; all combined standards under the technical committee's jurisdiction apply the same convention.

H3.1.2.3 *Specifying Selected Units in Combined Standard*— When citing a combined standard and applying only one system of units, indicate the system of units to be applied (see B9.4).

#### H4. Format Requirements for Standards in Inch-Pound Units

H4.1 For a standard citing inch-pound units of measurement as the standard units of measurement, follow the format requirement below:

H4.1.1 *Scope*— Include the following in the scope as a numbered paragraph:

1.X Units—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

H4.2 *Units*— Within the text, inch-pound units shall appear first followed by non-rationalized SI units in parentheses.

#### H5. Special Format Considerations

H5.1 *Repetitive Equivalents*— For standards in which inch-pound units are regarded as standard, insert a specific repetitive SI equivalent only the first time it occurs in each paragraph of a standard.

H5.2 *Expressing General Units*— When a standard specifies units for reporting results, the preferred unit in each system should be stated, especially in the case of compound units. For example, “Report twist of yarn in twists per inch (twists per metre)”; not “... in twists per inch (25.4 mm).”

H5.3 *Using Percentages for Tolerance Limits*— When appropriate, eliminate the need for equivalents in the case of tolerances by expressing the limits in percentages.

H5.4 *Sieve Sizing*— When a standard cites sieve sizes, use the standard sieve sizes given in Table 1 of ASTM Specification E11, Wire Cloth and Sieves for Testing Purposes.

H5.5 Where it has been long-standing practice to use SI units alone (such as stating temperatures only in degrees Celsius), equivalents may be omitted.

#### H6. Tables

H6.1 For instructions on including SI units in tables, see Section G27.

## **ANNEX A**

### **SI QUICK REFERENCE GUIDE**

# SI QUICK REFERENCE GUIDE:

## International System of Units (SI) The Modern Metric System\*

### UNITS

The International System of Units (SI) is based on seven base units:

#### Base Units

| Quantity                  | Name     | Symbol |
|---------------------------|----------|--------|
| length                    | metre    | m      |
| mass                      | kilogram | kg     |
| time                      | second   | s      |
| electric current          | ampere   | A      |
| thermodynamic temperature | kelvin   | K      |
| amount of substance       | mole     | mol    |
| luminous intensity        | candela  | cd     |

and a number of derived units which are combinations of base units and which may have special names and symbols:

#### Examples of Derived Units

| Quantity               | Expression          | Name           | Symbol |
|------------------------|---------------------|----------------|--------|
| acceleration           |                     |                |        |
| angular                | rad/s <sup>2</sup>  |                |        |
| linear                 | m/s <sup>2</sup>    |                |        |
| angle                  |                     |                |        |
| plane                  | dimensionless       | radian         | rad    |
| solid                  | dimensionless       | steradian      | sr     |
| area                   | m <sup>2</sup>      |                |        |
| Celsius temperature    | K                   | degree Celsius | °C     |
| density                |                     |                |        |
| heat flux              | W/m <sup>2</sup>    |                |        |
| mass                   | kg/m <sup>3</sup>   |                |        |
| current                | A/m <sup>2</sup>    |                |        |
| energy, enthalpy       |                     |                |        |
| work, heat             | N·m                 | joule          | J      |
| specific               | J/kg                |                |        |
| entropy                |                     |                |        |
| heat capacity          | J/K                 |                |        |
| specific               | J/(kg·K)            |                |        |
| flow, mass             | kg/s                |                |        |
| flow, volume           | m <sup>3</sup> /s   |                |        |
| force                  | kg·m/s <sup>2</sup> | newton         | N      |
| frequency              |                     |                |        |
| periodic               | 1/s                 | hertz          | Hz     |
| rotating               | rev/s               |                |        |
| inductance             | Wb/A                | henry          | H      |
| magnetic flux          | V·s                 | weber          | Wb     |
| mass flow              | kg/s                |                |        |
| moment of a force      | N·m                 |                |        |
| potential, electric    | W/A                 | volt           | V      |
| power, radiant flux    | J/s                 | watt           | W      |
| pressure, stress       | N/m <sup>2</sup>    | pascal         | Pa     |
| resistance, electric   | V/A                 | ohm            | Ω      |
| thermal conductivity   | W/(m·K)             |                |        |
| velocity               |                     |                |        |
| angular                | rad/s               |                |        |
| linear                 | m/s                 |                |        |
| viscosity              |                     |                |        |
| dynamic (absolute) (μ) | Pa·s                |                |        |
| kinematic (ν)          | m <sup>2</sup> /s   |                |        |
| volume                 | m <sup>3</sup>      |                |        |
| volume, specific       | m <sup>3</sup> /kg  |                |        |

\* For complete information see IEEE/ASTM SI-10.

## SYMBOLS

| Symbol | Name              | Quantity                      | Formula  |
|--------|-------------------|-------------------------------|--|
| A      | ampere            | electric current              | base unit                                      |
| Bq     | becquerel         | activity (of a radio nuclide) | 1/s  |
| C      | coulomb           | electric charge               | A·s  |
| °C     | degree Celsius    | temperature interval          | °C = K   |
| cd     | candela           | luminous intensity            | base unit                                      |
| F      | farad             | electric capacitance          | C/V  |
| Gy     | gray              | absorbed dose                 | J/kg   |
| g      | gram              | mass                          | kg/1000  |
| H      | henry             | inductance                    | Wb/A   |
| Hz     | hertz             | frequency                     | 1/s  |
| ha     | hectare*          | area                          | 10 000 m <sup>2</sup>                          |
| J      | joule             | energy, work, heat            | N·m  |
| K      | kelvin            | temperature                   | base unit                                      |
| kg     | kilogram          | mass                          | base unit                                      |
| L      | litre             | volume                        | m <sup>3</sup> /1000                           |
| lm     | lumen             | luminous flux                 | cd·sr  |
| lx     | lux               | illuminance                   | lm/m <sup>2</sup>                              |
| m      | metre             | length                        | base unit                                      |
| mol    | mole              | amount of substance           | base unit                                      |
| N      | newton            | force                         | kg·m/s <sup>2</sup>                            |
| Ω      | ohm               | electric resistance           | V/A  |
| Pa     | pascal            | pressure, stress              | N/m <sup>2</sup>                               |
| rad    | radian            | plane angle                   | m/m (dimensionless)                            |
| S      | siemens           | electric conductance          | A/V  |
| Sv     | sievert           | dose equivalent               | J/kg   |
| s      | second            | time                          | base unit                                      |
| sr     | steradian         | solid angle                   | m <sup>2</sup> /m <sup>2</sup> (dimensionless) |
| T      | tesla             | magnetic flux density         | Wb/m <sup>2</sup>                              |
| t      | tonne, metric ton | mass                          | 1000 kg, Mg                                    |
| V      | volt              | electric potential            | W/A  |
| W      | watt              | power, radiant flux           | J/s  |
| Wb     | weber             | magnetic flux                 | V·s  |
|        | * allowed with SI |                               |  |

### Use of Symbols

The correct use of symbols is important because an incorrect symbol may change the meaning of a quantity. Some SI symbols are listed in the Symbol table.

SI has no abbreviations—only symbols. Therefore, no periods follow a symbol except at the end of a sentence.

*Examples:* A, *not* amp; s *not* sec; SI, *not* S.I.

Symbols appear in lower case unless the unit name has been taken from a proper name. In this case the first letter of the symbol is capitalized.

*Examples:* m, metre; Pa, pascal; W, watt

*Exception:* L, litre

Symbols and prefixes are printed in upright (roman) type regardless of the type style in surrounding text.

*Example:* . . . a distance of 73 km between . . .

Unit symbols are the same whether singular or plural.

*Examples:* 1 mm, 100 mm; 1 kg, 65 kg

Leave a space between the value and the symbol.

*Examples:* 115 W, *not* 115W; 0.75 L, *not* 0.75L  
88 °C, *not* 88°C or 88° C

*Exception:* No space is left between the numerical value and symbol for degree of plane angle.

*Examples:* 73°, *not* 73 °

Note: Symbol for coulomb is C; for degree Celsius it is °C

Do not mix symbols and names in the same expression.

*Examples:* radians per second or rad/s,  
*not* radians/second; *not* radians/s  
m/s or metres per second,  
*not* metres/second; *not* metres/s  
J/kg or joules per kilogram,  
*not* joules/kilogram; *not* joules/kg

Symbol for product—use the raised dot (·)

*Examples:* N·m; mPa·s; W/(m<sup>2</sup>·K)

Symbol for quotient—use one of the following forms:

*Examples:* m/s or m/s or use the negative exponent

Note: Use only one solidus (/) per expression and parentheses to avoid any ambiguity.

## PREFIXES

Most prefixes indicate orders of magnitude in steps of 1000 and provide a convenient way to express large and small numbers and to eliminate nonsignificant digits and leading zeroes in decimal fractions.

*Examples:* 64 000 watts is the same as 64 kilowatts\*  
0.057 metre is the same as 57 millimetres  
16 000 metres is the same as 16 kilometres\*  
\*except for intended accuracy

| Prefix            | Symbol | Represents |
|-------------------|--------|------------|
| yotta             | Y      | $10^{24}$  |
| zetta             | Z      | $10^{21}$  |
| exa               | E      | $10^{18}$  |
| peta              | P      | $10^{15}$  |
| tera              | T      | $10^{12}$  |
| giga              | G      | $10^9$     |
| mega              | M      | $10^6$     |
| kilo              | k      | $10^3$     |
| hecto             | h      | $10^2$     |
| deka              | da     | $10^1$     |
| deci              | d      | $10^{-1}$  |
| centi             | c      | $10^{-2}$  |
| milli             | m      | $10^{-3}$  |
| micro             | $\mu$  | $10^{-6}$  |
| nano              | n      | $10^{-9}$  |
| pico              | p      | $10^{-12}$ |
| femto             | f      | $10^{-15}$ |
| atto              | a      | $10^{-18}$ |
| zepto             | z      | $10^{-21}$ |
| yocto             | y      | $10^{-24}$ |
| * allowed with SI |        |            |

To realize the full benefit of the prefixes when expressing a quantity by numerical value, choose a prefix so that the number lies between 0.1 and 1000. For simplicity, give preference to prefixes representing 1000 raised to an integral power (i.e., mm,  $\mu$ m, km).

*\*Exceptions:* In expressing area and volume, the prefixes hecto, deka, deci, and centi may be required; for example, cubic decimetre (L), square hectometre (hectare), cubic centimetre.

Tables of values of the same quantity.

Comparison of values.

For certain quantities in particular applications. For example, the millimetre is used for linear dimensions in architectural and engineering drawings even when the values lie far outside the range of 0.1 mm to 1000 mm; the centimetre is usually used for anatomical measurements and clothing sizes.

**Compound Units.** A compound unit is a derived unit expressed with two or more units. The prefix is attached to a unit in the numerator.

*Examples:* V/m not mV/mm

MJ/kg not kJ/g

**Compound prefixes** formed by a combination of two or more prefixes are not used. Use only one prefix.

*Examples:* 2 nm not 2 mpm;  
6 m<sup>3</sup> not 6 kL;  
6 mPa not 6 kPa

**Exponential Powers.** An exponent attached to a symbol containing a prefix indicates that the multiple (of the unit with its prefix) is raised to the power of 10 expressed by the exponent.

*Examples:* 1 mm<sup>3</sup> =  $(10^{-3} \text{ m})^3 = 10^{-9} \text{ m}^3$   
1 ns<sup>-1</sup> =  $(10^{-9} \text{ s})^{-1} = 10^9 \text{ s}^{-1}$   
1 mm<sup>2</sup>/s =  $(10^{-3} \text{ m})^2/\text{s} = 10^{-6} \text{ m}^2/\text{s}$

## NUMBERS

International practice separates the digits of large numbers into groups of three, counting from the decimal to the left and to the right, and inserts a space to separate the groups. In numbers of four digits, the space is not necessary except for the uniformity in tables.

*Examples:* 6.358 568; 85 365; 51 845 953; 88 000;  
0.246 113 562; 7 258

**Small Numbers.** When writing a number between one and minus one, put a zero before the decimal marker.

Note: This applies to large numbers which have an exponent: as  $-0.1 \times 10^6$ . This rule is given colloquially as "never use a naked decimal point."

**Decimal Marker.** The recommended decimal marker is a dot on the line (period). (In some countries, a comma is used as the decimal marker.)

Because **billion** means a million million in most countries but a thousand million in the United States, avoid using billion in technical writing.

## DO'S AND DON'TS

The units in the international system of units are called SI units—not Metric Units and not SI Metric Units.

Non-SI units include inch-pound units, old metric units and many other units. Inch=pound units (IP) refers to sets of units which contain inches and pounds. These include so-called customary units, US customary units, conventional units, imperial units, and English units.

Treat all spelled out names as nouns. Therefore, do not capitalize the first letter of a unit except at the beginning of a sentence or in capitalized material such as a title.

*Examples:* watt; pascal; ampere; volt; newton; kelvin  
*Exception:* Always capitalize the first letter of Celsius.

Do not begin a sentence with a unit symbol—either rearrange the unit names or write the unit name in full.

Use plurals for spelled out unit names when required by the rules of grammar.

*Examples:* metre—metres; henry—henries;  
kilogram—kilograms; kelvin—kelvins  
*Irregular:* hertz—hertz; lux—lux; siemens—siemens

Do not put a space or hyphen between the prefix and unit name.

*Examples:* kilometre *not* kilo metre or kilo-metre;  
milliwatt *not* milli watt or milli-watt

When a prefix ends with a vowel and the unit name begins with a vowel, retain and pronounce both vowels.

*Example:* kiloampere

*Exceptions:* hectare; kilohm; megohm

When a derived unit name is formed by multiplication, leave a space between units that are multiplied.

*Examples:* newton metre, *not* newton-metre;  
volt ampere, *not* volt-ampere

Use the modifier squared or cubed after the unit name.

*Example:* metre per second squared  
*Exception:* For area or volume the modifier may be placed before the units.

*Example:* square millimetre; cubic metre

When derived units are formed by division, use the word *per*, *not* a solidus (/).

*Examples:* metre per second, *not* metre/second; watt per square metre, *not* watt/square meter

## SELECTED CONVERSION FACTORS

**CAUTION:** These conversion values are rounded to three or four significant figures, which is sufficiently accurate for most applications. When making conversions, remember that a converted value is no more precise than the original value. Round off the final value to the same number of significant figures as those in the original value. See ANSI SI-10 for additional conversions with more significant figures.

| Multiply                                       | By       | To Obtain             |
|--|----------|-----------------------|
| acre   | 0.4047   | ha                    |
| atmosphere, standard                           | *101.325 | kPa                   |
| bar  | *100     | kPa                   |
| barrel (42 US gal, petroleum)                  | 159      | L                     |
| Btu, (International Table)                     | 1.055    | kJ                    |
| Btu/lb·°F (specific heat, C°)                  | 4.184    | kJ/(kg·K)             |
| bushel   | 0.03524  | m <sup>3</sup>        |
| calorie, kilogram (kilocalorie)                | 4.187    | kJ                    |
| candle, candlepower                            | *1.0     | cd                    |
| centipoise, dynamic viscosity, $\mu$           | *1.00    | mPa·s                 |
| centistokes, kinematic viscosity, $\nu$        | *1.00    | mm <sup>2</sup> /s    |
| ft   | *0.3048  | m                     |
| ft   | *304.8   | mm                    |
| ft/min, fpm                                    | *0.00508 | m/s                   |
| ft/s, fps                                      | *0.3048  | m/s                   |
| ft of water                                    | 2.99     | kPa                   |
| ft <sup>2</sup>                                | 0.09290  | m <sup>2</sup>        |
| ft <sup>2</sup> /s, kinematic viscosity, $\nu$ | 92.900   | mm <sup>2</sup> /s    |
| ft <sup>3</sup>                                | 28.32    | L                     |
| ft <sup>3</sup>                                | 0.02832  | m <sup>3</sup>        |
| ft <sup>3</sup> /h, cfh                        | 7.866    | mL/s                  |
| ft <sup>3</sup> /min, cfm                      | 0.4719   | L/s                   |
| ft <sup>3</sup> /s, cfs                        | 28.32    | L/s                   |
| footcandle                                     | 10.76    | lx                    |
| ft·lb <sub>f</sub> (torque or moment)          | 1.36     | N·m                   |
| ft·lb <sub>f</sub> (work)                      | 1.36     | J                     |
| ft·lb <sub>f</sub> /b (specific energy)        | 2.99     | J/kg                  |
| ft·lb <sub>f</sub> /min (power)                | 0.0226   | W                     |
| gallon, US (*231 in <sup>3</sup> )             | 3.785    | L                     |
| gph  | 1.05     | mL/s                  |
| gpm  | 0.0631   | L/s                   |
| gpm/ft <sup>2</sup>                            | 0.6791   | L/(s·m <sup>2</sup> ) |
| gr/gal   | 17.1     | g/m <sup>3</sup>      |
| horsepower (550 ft·lb/s)                       | 0.746    | kW                    |
| inch   | *25.4    | mm                    |
| in. of mercury (60°F)                          | 3.377    | kPa                   |

| <i>Multiply</i>   | <i>By</i> | <i>To Obtain</i>  |
|---|-----------|-------------------|
| in of water (60°F)  | 248.8     | Pa                |
| in lb <sub>f</sub> (torque or moment)                     | 113       | mN·m              |
| in <sup>2</sup>   | 645       | mm <sup>2</sup>   |
| in <sup>3</sup> (volume)                                  | 16.4      | mL                |
| in <sup>3</sup> (section modulus)                         | 16 400    | mm <sup>3</sup>   |
| in <sup>4</sup> (section moment)                          | 416 200   | mm <sup>4</sup>   |
| km/h  | 0.278     | m/s               |
| kWh   | *3.60     | MJ                |
| kip/in <sup>2</sup> (ksi)                                 | 6.895     | MPa               |
| litre   | *0.001    | m <sup>3</sup>    |
| micron (μm) of mercury (60°F)                             | 133       | mPa               |
| mil (0.001 in.)   | *25.4     | mm                |
| mile  | 1.61      | km                |
| mile, nautical  | 1.85      | km                |
| mph   | 1.61      | km/h              |
| mph   | 0.447     | m/s               |
| millibar  | *0.100    | kPa               |
| mm of mercury (60°F)                                      | 0.133     | kPa               |
| mm of water (60°F)  | 9.80      | Pa                |
| ounce (mass, avoirdupois)                                 | 28.35     | g                 |
| ounce (force of thrust)                                   | 0.278     | N                 |
| ounce (liquid, US)  | 29.6      | mL                |
| ounce (avoirdupois) per gallon                            | 7.49      | kg/m <sup>3</sup> |
| pint (liquid, US)   | 473       | mL                |
| pound   |           |                   |
| lb <sub>m</sub> (mass)                                    | 0.4536    | kg                |
| lb <sub>m</sub> (mass)                                    | 453.6     | g                 |
| lb <sub>f</sub> (force or thrust)                         | 4.45      | N                 |
| lb <sub>m</sub> /ft (uniform load)                        | 1.49      | kg/m              |
| lb <sub>m</sub> /(ft·h) (dynamic viscosity, μ)            | 0.413     | mPa·s             |
| lb <sub>m</sub> /(ft·s) (dynamic viscosity, μ)            | 1490      | mPa·s             |
| lb <sub>f</sub> ·s/ft <sup>2</sup> (dynamic viscosity, μ) | 47 980    | mPa·s             |
| lb <sub>m</sub> /min                                      | 0.00756   | kg/s              |
| lb <sub>m</sub> /h  | 0.126     | g/s               |
| lb <sub>f</sub> /ft <sup>2</sup>                          | 47.9      | Pa                |
| lb <sub>m</sub> /ft <sup>2</sup>                          | 4.88      | kg/m <sup>2</sup> |
| lb <sub>m</sub> /ft <sup>3</sup> (density, ρ)             | 16.0      | kg/m <sup>3</sup> |
| lb <sub>m</sub> /gallon                                   | 120       | kg/m <sup>3</sup> |
| ppm (by mass)   | *1.00     | mg/kg             |
| psi   | 6.895     | kPa               |
| quad (10 <sup>16</sup> Btu)                               | 1.06      | EJ                |
| quart (liquid, US)  | 0.946     | L                 |
| rpm   | 0.105     | rad/s             |
| tablespoon (approx.)                                      | 15        | mL                |
| teaspoon (approx.)  | 5         | mL                |
| therm (100,000 Btu)                                       | 105.5     | MJ                |
| ton, short (2000 lb)                                      | 0.907     | Mg, t (tonne)     |
| yd  | *0.9144   | m                 |
| yd <sup>2</sup>   | 0.836     | m <sup>2</sup>    |
| yd <sup>3</sup>   | 0.7646    | m <sup>3</sup>    |

\* Conversion factor is exact.

Note: In this list the kelvin (K) expresses temperature intervals. The degree Celsius symbol (°C) may be used for this purpose as well.

### Summary of Changes

The following changes were made since the March 2014 edition and published in this edition.

- (1) Revised Sections G3.6, G24.1, and H1.2.2 to reference IEEE SI 10, the SI Quick Reference Guide, and Part G and Part H. The ASTM Form and Style is the default document for formatting so that the spelling of litre and metre can be maintained.
- (2) Revised G14.1 and G18.3.3 to reflect using space rather than hyphen for compound adjectives using SI units.
- (3) Added the SI Quick Reference Guide to the Form and Style Manual as Annex A.
- (4) General revisions were made to reflect current practices.

The following changes were made since the October 2013 edition and published in this edition.

- (1) Added F2.6, Mercury Caveat.

The following changes were made since the March 2013 edition and published in this edition.

- (1) Revised Section F1 on Commercial-Contractual Items in Standards.
- (2) Editorially revised Section G12 on Creating and Submitting Figures for Ballot

The following changes were made since the October 2012 edition and published in this edition.

- (1) Editorially revised B22.1 on Product Marking.

The following changes were made since the March 2012 edition and published in this edition.

- (1) Revised Section A21 on Precision and Bias.

The following changes were made since the October 2011 edition and published in this edition.

- (1) Clarified use of the term “dictionary” to mean print or electronic reference materials in A7.1.1, E2.1, E3.3.1, E5.9, G10.1, G15.1.5, and G25.1.
- (2) Editorially updated ASTM standards references in A17.1, A19.2, and the table in G3.6 (Vickers Hardness number)

The following changes were made since the October 2010 edition and published in this edition.

- (1) Clarified language in Section F1.
- (2) Revised Ordering Information, B9.3, to focus on the importance of referenced documents within a specification, and to encourage the use of year dates.
- (3) Editorially changed A27.4 and A29.4 to correct a reference in the [\*Regulations Governing ASTM Technical Committees\*](#).
- (4) Editorially updated the title of IEEE/ASTM SI-10 in G3.6.

The following changes were made since the March 2010 edition and published in this edition.

- (1) Editorially removed reference to ANSI Y10.3M in A19.1 since it was withdrawn without replacement.
- (2) Revised D4 with the addition of D4.1.2 to modify language on the current editorial practice for Supplementary Requirements.
- (3) Editorially changed E3.3.3 to update the referenced title to *ASTM Online Dictionary of Engineering Science and Technology*.
- (4) Revised F4.1 to include ASTM Certification Programs.

The following changes were made since the September 2009 edition and published in this edition.

- (1) Added “kerosene” as an acceptable spelling in G25.1.

The following changes were made since the March 2009 edition and published in this edition.

- (1) Revisions of A27.1 and B29.1 for better clarity.
- (2) Replaced G12 with a new procedure for creating and submitting figures for ballot.
- (3) Editorial changes were made to C2, C16, A26.4, and B28.4.

The following changes were made since the March 2008 edition and published in this edition.

- (1) Insertion of new sections F2.2.2.5 and F2.2.2.6 dealing with Fire Standards Safety Caveats.

## SUMMARY OF CHANGES

The following changes were made since the October 2007 edition and published in this edition.

- (1) Revisions were made to Part G dealing with Styling, Electronic Manuscript Preparation, Abbreviations, Figures, Mathematical Material, and Thermometers.

The following changes were made since the October 2006 edition and published in this edition.

- (1) Removal of the ‘separated by a space’ requirement in standard designation numbers found in A3.1.2 and B4.1.2.
- (2) Insertion of new section G16.6.1 and an example for clarifying how to place a multiplication symbol in an equation.
- (3) Revision of G27.7 for better clarity.
- (4) Revision of H1.2.1 for better clarity, as well as to include a *Discussion* on the use of SI units in standards.
- (5) Reversal of the order of appearance of Sections H3 and H4.

The following changes were made since the March 2006 edition and published in this edition.

- (1) Insertion of a new section F4.1 to clarify ASTM’s policy on certification and accreditation.
- (2) Reversal of the order of appearance of the *Trademarks* section with the *Sources of Supply* section for a more logical flow.
- (3) Removal of the word *reference* where used as an adjective in the term *reference material* to expand this section to cover all materials – not just *reference materials*.
- (4) Insertion of new language as F4.2.2 to make trademark language consistent with [Regulations Governing ASTM Technical Committees](#) and Board Policy.

The following changes were made since the October 2005 edition and published in this edition.

- (1) Revisions were made to A21.4.1, A21.4.2, and A21.5.4 to clarify the intent of the language.
- (2) Sections A29 and B31 on Research Reports

were revised to make clearer the instructions on how the research report is to be referenced in a standard.

- (3) Revision to F2.4, Working Document Caveat, in order to remain consistent with ASTM policy.
- (4) Revisions were made to Sections F4 and F4.2 dealing with Use of Trademarks.

The following changes were made since the March 2005 edition and published in this edition.

- (1) Revision to Working Draft Caveat, F2.4, in order to remain consistent with ASTM policy.
- (2) Section G25.1, added (measurement, instrument) to “gauge” and deleted spelling “gage.”

The following changes were made since the September 2004 edition and published in this edition.

- (1) Section A18.3 was deleted. Including this section was redundant and could lead to confusion.
- (2) New Section H1.2.2.1 was added pertaining to rounding of SI Units.

The following changes were made since the April 2004 edition and published in this edition.

- (1) New Section A21.4.5 pertaining to precision and bias was added.
- (2) A revision was made in B1.2 for clarification.

The following changes were made since the September 2003 edition and published in this edition.

- (1) Revisions to A1.4 clarify how to identify different test methods within a standard.
- (2) New Section A22 on Measurement Uncertainty was added.
- (3) Revision to F1 was made and new Section F1.4 was added concerning effective dates.
- (4) Revisions were made to F3.1, F3.1.1, and F3.1.2 dealing with patents.

The following changes were made since the March 2003 edition and published in this edition.

## SUMMARY OF CHANGES

- (1) The following sentence was added in B25.1. "These should not include statements that would allow the lowering of minimum requirements of the standard (seeB1.2)."
- (2) Megagram (Mg) was added to G3.6.

The following changes were made since the September 2002 edition and published in this March 2003 edition.

- (1) New definitions for "publication date" and "approval date" were added to p. viii on Definitions
- (2) Sections A31.3, B34.3, and C31.3 on Summary of Change Sections were revised to permit standards that have undergone multiple revisions in a short period of time to retain changes for 18 months.
- (3) The statement in A21.5.3 was revised to correct ambiguity in the requirement for precision and bias.

The following changes were made editorially since the March 2002 edition and are published in the September 2002 edition.

- (1) Replaced the verbiage "year of issue" and "date of issue" with "year date" throughout.
- (2) Standardized the terms "purchase order or contract" in Part B.
- (3) An additional sentence was included in F3.1 regarding the ANSI patent policy.

The sections shown below have been editorially changed since the October 2001 edition and are published in the March 2002 edition.

- (1) Section G2 on Electronic Manuscript Preparations was replaced.
- (2) Additional sentences were included in the suggested statement in B21.2.

The following changes were made since the March 2001 edition and published in the October 2001 edition.

- (1) Deletion of A3.1.3 and A5.4 regarding companion standards. The same changes were made to B4.1.3 and B4.4.1
- (2) Mandatory for Standards Producing Numerical Results was added to the heading of Section A29 on Research Reports.
- (3) New section F2.2.2.4 dealing with a fire risk assessment statement.
- (4) Deletion of G24.2 dealing with companion standards.

The following changes were made since the February 2000 edition and are published in the March 2001 edition.

- (1) Revisions to Section B21 on Certification.

The following changes were made since the December 1998 edition and are published in the February 2000 edition.

- (1) Revision to Section A13 to revised A13.1.1 on Warning Statement, delete A13.1.2 on Precautionary Statement, and delete A13.2 on Technical Hazards. Revise F2.1.2 and F2.1.3 to eliminate wording dealing with precautionary statements.

The following changes were made since the January 1996 edition and published in the December 1998 edition.

- (1) Revision to Part H dealing with the use of SI units in ASTM standards. Revision to G38. These were the results from Circular Letter #713.
- (2) Added new F2.5 Professional Judgment Caveat.

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# EXHIBIT 6



Designation: D 86 – 07

An American National Standard

## Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure<sup>1</sup>

This standard is issued under the fixed designation D 86; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope\*

1.1 This test method covers the atmospheric distillation of petroleum products using a laboratory batch distillation unit to determine quantitatively the boiling range characteristics of such products as light and middle distillates, automotive spark-ignition engine fuels, aviation gasoline, aviation turbine fuels, 1-D and 2-D regular and low sulfur diesel fuels, special petroleum spirits, naphthas, white spirits, kerosines, and Grades 1 and 2 burner fuels.

1.2 The test method is designed for the analysis of distillate fuels; it is not applicable to products containing appreciable quantities of residual material.

1.3 This test method covers both manual and automated instruments.

1.4 Unless otherwise noted, the values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information only.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

2.1 All standards are subject to revision, and parties to agreement on this test method are to apply the most recent edition of the standards indicated below, unless otherwise specified, such as in contractual agreements or regulatory rules where earlier versions of the method(s) identified may be required.

#### 2.2 ASTM Standards:<sup>2</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.08.0A on Distillation.

In the IP, the equivalent test method is published under the designation IP 123. It is under the jurisdiction of the Standardization Committee.

Current edition approved Jan. 15, 2007. Published February 2007. Originally approved in 1921. Last previous edition approved in 2005 as D 86–05.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- D 97 Test Method for Pour Point of Petroleum Products
- D 323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)
- D 2892 Test Method for Distillation of Crude Petroleum (15-Theoretical Plate Column)
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products
- D 4177 Practice for Automatic Sampling of Petroleum and Petroleum Products
- D 4953 Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)
- D 5190 Test Method for Vapor Pressure of Petroleum Products (Automatic Method)
- D 5191 Test Method for Vapor Pressure of Petroleum Products (Mini Method)
- D 5842 Practice for Sampling and Handling of Fuels for Volatility Measurement
- D 5949 Test Method for Pour Point of Petroleum Products (Automatic Pressure Pulsing Method)
- D 5950 Test Method for Pour Point of Petroleum Products (Automatic Tilt Method)
- D 5985 Test Method for Pour Point of Petroleum Products (Rotational Method)
- E 1 Specification for ASTM Liquid-in-Glass Thermometers
- E 77 Test Method for Inspection and Verification of Thermometers
- E 1272 Specification for Laboratory Glass Graduated Cylinders
- E 1405 Specification for Laboratory Glass Distillation Flasks
- 2.3 *Energy Institute Standards:*<sup>3</sup>
  - IP 69 Determination of Vapour Pressure—Reid Method
  - IP 123 Petroleum Products—Determination of Distillation Characteristics
  - IP 394 Determination of Air Saturated Vapour Pressure
  - IP Standard Methods for Analysis and Testing of Petroleum and Related Products 1996—Appendix A

<sup>3</sup> Available from Energy Institute, 61 New Cavendish St., London, W1G 7AR, U.K., <http://www.energyinst.org.uk>.

\*A Summary of Changes section appears at the end of this standard.



TABLE 1 Preparation of Apparatus

|                                      | Group 1     | Group 2   | Group 3            | Group 4                 |
|--------------------------------------|-------------|-----------|--------------------|-------------------------|
| Flask, mL                            | 125         | 125       | 125                | 125                     |
| ASTM distillation thermometer        | 7C (7F)     | 7C (7F)   | 7C (7F)            | 8C (8F)                 |
| IP distillation thermometer range    | low         | low       | low                | high                    |
| Flask support board                  | B           | B         | C                  | C                       |
| diameter of hole, mm                 | 38          | 38        | 50                 | 50                      |
| Temperature at start of test         |             |           |                    |                         |
| Flask                                | °C<br>13–18 | 13–18     | 13–18              | not above               |
|                                      | °F<br>55–65 | 55–65     | 55–65              | ambient                 |
| Flask support and shield             | not above   | not above | not above          |                         |
|                                      | ambient     | ambient   | ambient            |                         |
| Receiving cylinder and 100 mL charge |             |           |                    |                         |
|                                      | °C<br>13–18 | 13–18     | 13–18 <sup>a</sup> | 13–ambient <sup>a</sup> |
|                                      | °F<br>55–65 | 55–65     | 55–65 <sup>a</sup> | 55–ambient <sup>a</sup> |

<sup>a</sup> See 10.3.1.1 for exceptions.

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *charge volume, n*—the volume of the specimen, 100 mL, charged to the distillation flask at the temperature specified in Table 1.

3.1.2 *decomposition, n*—of a hydrocarbon, the pyrolysis or cracking of a molecule yielding smaller molecules with lower boiling points than the original molecule.

3.1.2.1 *Discussion*—Characteristic indications of thermal decomposition are evolution of fumes and erratic temperature readings that usually decrease after any attempt is made to adjust the heat.

3.1.3 *decomposition point, n*—the corrected thermometer reading that coincides with the first indications of thermal decomposition of the liquid in the flask.

3.1.3.1 *Discussion*—The decomposition point, as determined under the conditions of this test method, does not necessarily correspond to the decomposition temperature in other applications.

3.1.4 *dry point, n*—the corrected thermometer reading that is observed at the instant the last drop of liquid (exclusive of any drops or film of liquid on the side of the flask or on the temperature sensor), evaporates from the lowest point in the distillation flask.

3.1.4.1 *Discussion*—The end point (final boiling point), rather than the dry point, is intended for general use. The dry point can be reported in connection with special purpose naphthas, such as those used in the paint industry. Also, it is substituted for the end point (final boiling point) whenever the sample is of such a nature that the precision of the end point (final boiling point) cannot consistently meet the requirements given in the precision section.

3.1.5 *dynamic holdup, n*—the amount of material present in the neck of the flask, in the sidearm of the flask, and in the condenser tube during the distillation.

3.1.6 *emergent stem effect, n*—the offset in temperature reading caused by the use of total immersion mercury-in-glass thermometers in the partial immersion mode.

3.1.6.1 *Discussion*—In the partial immersion mode, a portion of the mercury thread, that is, the emergent portion, is at a lower temperature than the immersed portion, resulting in a shrinkage of the mercury thread and a lower temperature reading.

3.1.7 *end point (EP) or final boiling point (FBP), n*—the maximum corrected thermometer reading obtained during the test.

3.1.7.1 *Discussion*—This usually occurs after the evaporation of all liquid from the bottom of the flask. The term maximum temperature is a frequently used synonym.

3.1.8 *front end loss, n*—loss due to evaporation during transfer from receiving cylinder to distillation flask, vapor loss during the distillation, and uncondensed vapor in the flask at the end of the distillation.

3.1.9 *initial boiling point (IBP), n*—the corrected thermometer reading that is observed at the instant the first drop of condensate falls from the lower end of the condenser tube.

3.1.10 *percent evaporated, n*—the sum of the percent recovered and the percent loss.

3.1.11 *percent loss (or observed loss), n*—one hundred minus the percent total recovery.

3.1.11.1 *corrected loss, n*—percent loss corrected for barometric pressure.

3.1.12 *percent recovered, n*—the volume of condensate observed in the receiving cylinder, expressed as a percentage of the charge volume, associated with a simultaneous temperature reading.

3.1.13 *percent recovery, n*—the maximum percent recovered, as observed in accordance with 10.18.

3.1.13.1 *corrected percent recovery, n*—the percent recovery, adjusted for the difference between the observed loss and the corrected loss, as described in Eq 8.

3.1.13.2 *percent total recovery, n*—the combined percent recovery and residue in the flask, as determined in accordance with 11.1.

3.1.14 *percent residue, n*—the volume of residue in the flask, measured in accordance with 10.19, and expressed as a percentage of the charge volume.

3.1.15 *rate of change (or slope), n*—the change in temperature reading per percent evaporated or recovered, as described in 13.2.

3.1.16 *temperature lag, n*—the offset between the temperature reading obtained by a temperature sensing device and the true temperature at that time.

3.1.17 *temperature measurement device, n*—a thermometer, as described in 6.3.1, or a temperature sensor, as described in 6.3.2.

3.1.18 *temperature reading, n*—the temperature obtained by a temperature measuring device or system that is equal to the thermometer reading described in 3.1.19.

3.1.18.1 *corrected temperature reading, n*—the temperature reading, as described in 3.1.18, corrected for barometric pressure.

3.1.19 *thermometer reading (or thermometer result), n*—the temperature of the saturated vapor measured in the neck of the flask below the vapor tube, as determined by the prescribed thermometer under the conditions of the test.

3.1.19.1 *corrected thermometer reading, n*—the thermometer reading, as described in 3.1.19, corrected for barometric pressure.

#### 4. Summary of Test Method

4.1 Based on its composition, vapor pressure, expected IBP or expected EP, or combination thereof, the sample is placed in one of four groups. Apparatus arrangement, condenser temperature, and other operational variables are defined by the group in which the sample falls.

4.2 A 100-mL specimen of the sample is distilled under prescribed conditions for the group in which the sample falls. The distillation is performed in a laboratory batch distillation unit at ambient pressure under conditions that are designed to provide approximately one theoretical plate fractionation. Systematic observations of temperature readings and volumes of condensate are made, depending on the needs of the user of the data. The volume of the residue and the losses are also recorded.

4.3 At the conclusion of the distillation, the observed vapor temperatures can be corrected for barometric pressure and the data are examined for conformance to procedural requirements, such as distillation rates. The test is repeated if any specified condition has not been met.

4.4 Test results are commonly expressed as percent evaporated or percent recovered versus corresponding temperature, either in a table or graphically, as a plot of the distillation curve.

#### 5. Significance and Use

5.1 The basic test method of determining the boiling range of a petroleum product by performing a simple batch distillation has been in use as long as the petroleum industry has existed. It is one of the oldest test methods under the jurisdiction of ASTM Committee D02, dating from the time when it was still referred to as the Engler distillation. Since the test method has been in use for such an extended period, a tremendous number of historical data bases exist for estimating end-use sensitivity on products and processes.

5.2 The distillation (volatility) characteristics of hydrocarbons have an important effect on their safety and performance, especially in the case of fuels and solvents. The boiling range gives information on the composition, the properties, and the behavior of the fuel during storage and use. Volatility is the major determinant of the tendency of a hydrocarbon mixture to produce potentially explosive vapors.

5.3 The distillation characteristics are critically important for both automotive and aviation gasolines, affecting starting, warm-up, and tendency to vapor lock at high operating

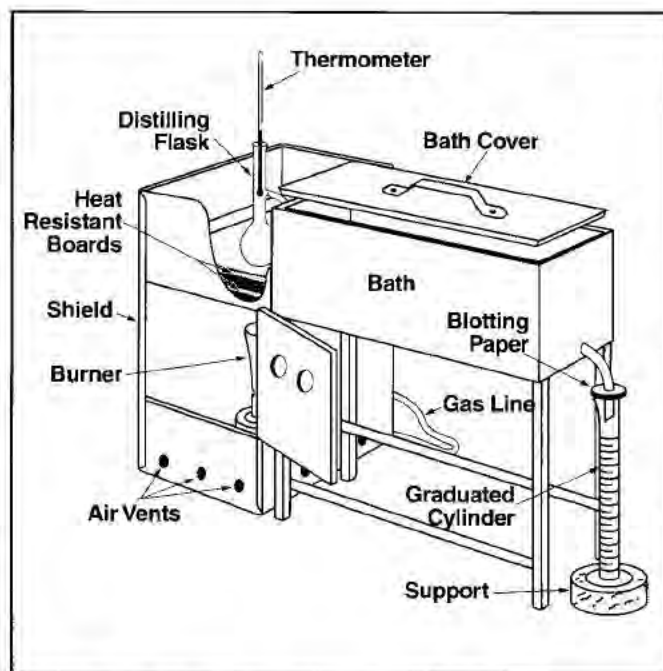


FIG. 1 Apparatus Assembly Using Gas Burner

temperature or at high altitude, or both. The presence of high boiling point components in these and other fuels can significantly affect the degree of formation of solid combustion deposits.

5.4 Volatility, as it affects rate of evaporation, is an important factor in the application of many solvents, particularly those used in paints.

5.5 Distillation limits are often included in petroleum product specifications, in commercial contract agreements, process refinery/control applications, and for compliance to regulatory rules.

#### 6. Apparatus

##### 6.1 Basic Components of the Apparatus:

6.1.1 The basic components of the distillation unit are the distillation flask, the condenser and associated cooling bath, a metal shield or enclosure for the distillation flask, the heat source, the flask support, the temperature measuring device, and the receiving cylinder to collect the distillate.

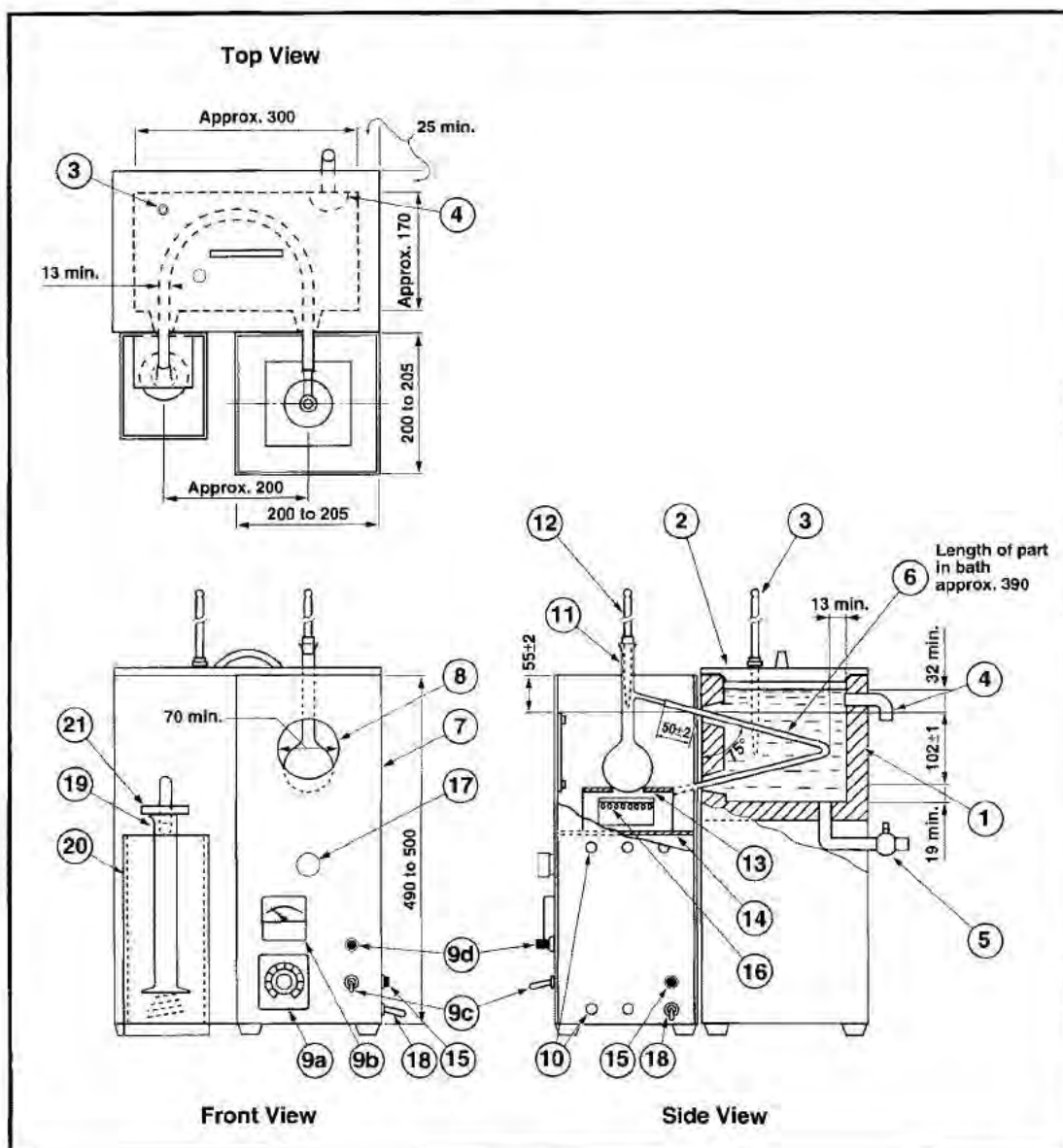
6.1.2 Figs. 1 and 2 are examples of manual distillation units.

6.1.3 In addition to the basic components described in 6.1.1, automated units also are equipped with a system to measure and automatically record the temperature and the associated recovered volume in the receiving cylinder.

6.2 A detailed description of the apparatus is given in Annex A2.

##### 6.3 Temperature Measuring Device:

6.3.1 Mercury-in-glass thermometers, if used, shall be filled with an inert gas, graduated on the stem and enamel backed. They shall conform to Specification E 1 or IP Standard Methods for Analysis and Testing of Petroleum and Related Products 1996—Appendix A, or both, for thermometers ASTM



- |                           |   |
|---------------------------|---|
| 1-Condenser bath          | 11-Distillation flask                           |
| 2-Bath cover              | 12-Temperature sensor                           |
| 3-Bath temperature sensor | 13-Flask support board                          |
| 4-Bath overflow           | 14-Flask support platform                       |
| 5-Bath drain              | 15-Ground connection                            |
| 6-Condenser tube          | 16-Electric heater                              |
| 7-Shield                  | 17-Knob for adjusting level of support platform |
| 8-Viewing window          | 18-Power source cord                            |
| 9a-Voltage regulator      | 19-Receiver cylinder                            |
| 9b-Voltmeter or ammeter   | 20-Receiver cooling bath                        |
| 9c-Power switch           | 21-Receiver cover                               |
| 9d-Power light indicator  |   |
| 10-Vent                   |   |

FIG. 2 Apparatus Assembly Using Electric Heater

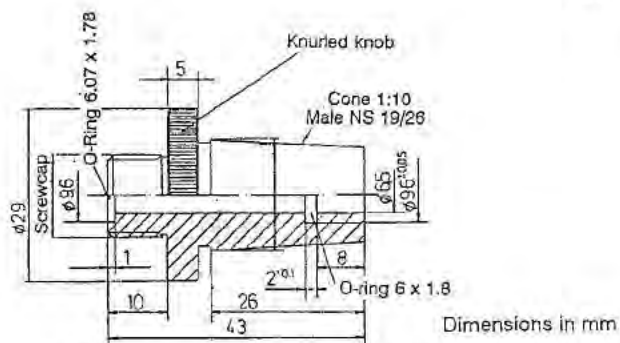


FIG. 3 PTFE Centering Device for Ground Glass Joint

7C/IP 5C and ASTM 7F for the low range thermometers, and ASTM 8C/IP 6C and ASTM 8F for the high range thermometers.

6.3.1.1 Thermometers that have been exposed for an extended period above an observed temperature of 370°C shall not be reused without a verification of the ice point or checked as prescribed in Specification E 1 and Test Method E 77.

NOTE 1—At an observed thermometer reading of 370°C, the temperature of the bulb is approaching a critical range in the glass and the thermometer may lose its calibration.

6.3.2 Temperature measurement systems other than those described in 6.3.1 are satisfactory for this test method, provided that they exhibit the same temperature lag, emergent stem effect, and accuracy as the equivalent mercury-in-glass thermometer.

6.3.2.1 The electronic circuitry or the algorithms, or both, used shall include the capability to simulate the temperature lag of a mercury-in-glass thermometer.

6.3.2.2 Alternatively, the sensor can also be placed in a casing with the tip of the sensor covered so that the assembly, because of its adjusted thermal mass and conductivity, has a temperature lag time similar to that of a mercury-in-glass thermometer.

NOTE 2—In a region where the temperature is changing rapidly during the distillation, the temperature lag of a thermometer can be as much as 3 seconds.

6.3.3 In case of dispute, the referee test method shall be carried out with the specified mercury-in-glass thermometer.

#### 6.4 Temperature Sensor Centering Device:

6.4.1 The temperature sensor shall be mounted through a snug-fitting device designed for mechanically centering the sensor in the neck of the flask without vapor leakage. Examples of acceptable centering devices are shown in Figs. 3 and 4. (**Warning**—The use of a plain stopper with a hole drilled through the center is not acceptable for the purpose described in 6.4.1.)

NOTE 3—Other centering devices are also acceptable, as long as they position and hold the temperature sensing device in the proper position in the neck of the distillation column, as shown in Fig. 5 and described in 10.5.

NOTE 4—When running the test by the manual method, products with

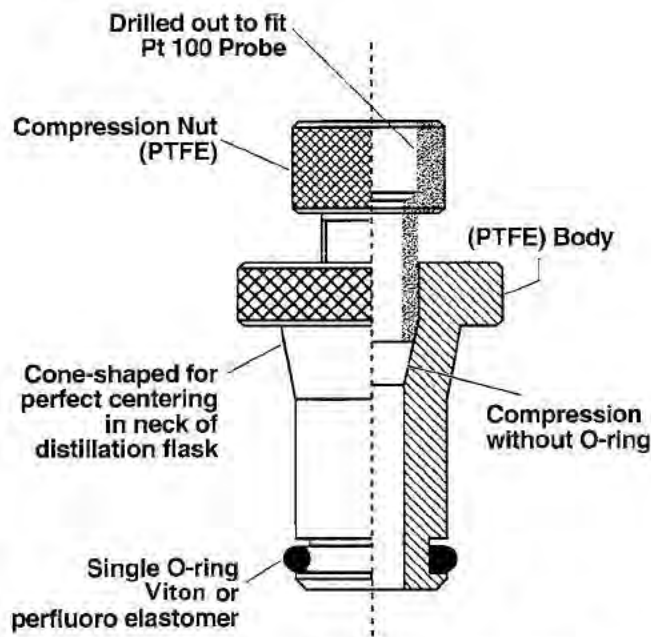


FIG. 4 Example of Centering Device Designs for Straight-Bore Neck Flasks

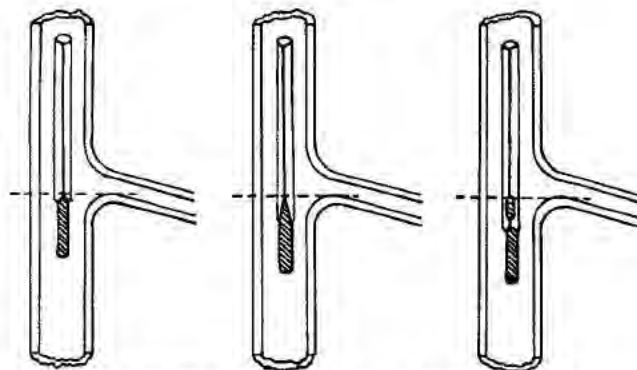


FIG. 5 Position of Thermometer in Distillation Flask

a low IBP may have one or more readings obscured by the centering device. See also 10.14.3.1.

6.5 Automated equipment manufactured in 1999 and later shall be equipped with a device to automatically shut down power to the unit and to spray an inert gas or vapor in the chamber where the distillation flask is mounted in the event of fire.

NOTE 5—Some causes of fires are breakage of the distillation flask, electrical shorts, and foaming and spilling of liquid sample through the top opening of the flask.

6.6 **Barometer**—A pressure measuring device capable of measuring local station pressure with an accuracy of 0.1 kPa (1 mm Hg) or better, at the same elevation relative to sea level as the apparatus in the laboratory. (**Warning**—Do not take readings from ordinary aneroid barometers, such as those used



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TABLE 2 Group Characteristics

|   | Group 1 | Group 2 | Group 3 | Group 4 |
|---|---------|---------|---------|---------|
| Sample characteristics  |         |         |         |         |
| Distillate type   |         |         |         |         |
| Vapor pressure at 37.8°C, kPa   | ≥65.5   | <65.5   | <65.5   | <65.5   |
| 100°F, psi  | ≥9.5    | <9.5    | <9.5    | <9.5    |
| (Test Methods D 323, D 4953, D 5190, D 5191, D 5482, IP 69 or IP 394) |         |         |         |         |
| Distillation, IBP °C  |         |         | ≤100    | >100    |
| °F  |         |         | ≤212    | >212    |
| EP °C   | ≤250    | ≤250    | >250    | >250    |
| °F  | ≤482    | ≤482    | >482    | >482    |

at weather stations and airports, since these are precorrected to give sea level readings.)

## 7. Sampling, Storage, and Sample Conditioning

7.1 Determine the Group characteristics that correspond to the sample to be tested (see Table 2). Where the procedure is dependent upon the group, the section headings will be so marked.

### 7.2 Sampling:

7.2.1 Sampling shall be done in accordance with Practice D 4057 or D 4177 and as described in Table 3.

7.2.1.1 *Group 1*—Condition the sample container to below 10°C, preferably by filling the bottle with the cold liquid sample and discarding the first sample. If this is not possible because, for instance, the product to be sampled is at ambient temperature, the sample shall be drawn into a bottle prechilled to below 10°C, in such a manner that agitation is kept at a minimum. Close the bottle immediately with a tight-fitting closure. (**Warning**—Do not completely fill and tightly seal a cold bottle of sample because of the likelihood of breakage on warming.)

7.2.1.2 *Groups 2, 3, and 4*—Collect the sample at ambient temperature. After sampling, close the sample bottle immediately with a tight-fitting closure.

7.2.1.3 If the sample received by the testing laboratory has been sampled by others and it is not known whether sampling has been performed as described in 7.2, the sample shall be assumed to have been so sampled.

### 7.3 Sample Storage:

7.3.1 If testing is not to start immediately after collection, store the samples as indicated in 7.3.2, 7.3.3, and Table 3. All samples shall be stored away from direct sunlight or sources of direct heat.

7.3.2 *Group 1*—Store the sample at a temperature below 10°C.

NOTE 6—If there are no, or inadequate, facilities for storage below 10°C, the sample may also be stored at a temperature below 20°C, provided the operator ensures that the sample container is tightly closed and leak-free.

7.3.3 *Group 2*—Store the sample at a temperature below 10°C.

NOTE 7—If there are no, or inadequate, facilities for storage below

10°C, the sample may also be stored at a temperature below 20°C, provided the operator ensures that the sample container is tightly closed and leak-free.

7.3.4 *Groups 3 and 4*—Store the sample at ambient or lower temperature.

### 7.4 Sample Conditioning Prior to Analysis:

7.4.1 Samples shall be conditioned to the temperature shown in Table 3 before opening the sample container.

7.4.1.1 *Groups 1 and 2*—Samples shall be conditioned to a temperature of less than 10°C (50°F) before opening the sample container.

7.4.1.2 *Groups 3 and 4*—If the sample is not fluid at ambient temperature, it is to be heated to a temperature of 9 to 21°C above its pour point (Test Method D 97, D 5949, or D 5985) prior to analysis. If the sample has partially or completely solidified during storage, it shall be vigorously shaken after melting prior to opening the sample container to ensure homogeneity.

7.4.1.3 If the sample is not fluid at room temperature, the temperature ranges shown in Table 3 for the flask and for the sample do not apply.

### 7.5 Wet Samples:

7.5.1 Samples of materials that visibly contain water are not suitable for testing. If the sample is not dry, obtain another sample that is free from suspended water.

7.5.2 *Groups 1 and 2*—If such a sample cannot be obtained, the suspended water can be removed by maintaining the sample at 0 to 10°C, adding approximately 10 g of anhydrous sodium sulfate per 100 mL of sample, shaking the mixture for approximately 2 min, and then allowing the mixture to settle for approximately 15 min. Once the sample shows no visible signs of water, use a decanted portion of the sample, maintained between 1 and 10°C, for the analysis. Note in the report that the sample has been dried by the addition of a desiccant.

NOTE 8—Suspended water in hazy samples in Groups 1 and 2 can be removed by the addition of anhydrous sodium sulfate and separating the liquid sample from the drying agent by decanting without statistically affecting the results of the test.<sup>4</sup>

7.5.3 *Groups 3 and 4*—In cases in which a water-free sample is not practical, the suspended water can be removed by shaking the sample with anhydrous sodium sulfate or other suitable drying agent and separating it from the drying agent by decanting. Note in the report that the sample has been dried by the addition of a desiccant.

## 8. Preparation of Apparatus

8.1 Refer to Table 1 and prepare the apparatus by choosing the appropriate distillation flask, temperature measuring device, and flask support board, as directed for the indicated group. Bring the temperature of the receiving cylinder, the flask, and the condenser bath to the indicated temperature.

8.2 Make any necessary provisions so that the temperature of the condenser bath and the receiving cylinder will be maintained at the required temperatures. The receiving cylinder shall be in a bath such that either the liquid level is at least

<sup>4</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D02-1455.



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TABLE 3 Sampling, Storage, and Sample Conditioning

|  |    | Group 1                      | Group 2  | Group 3   | Group 4   |
|--|----|------------------------------|----------|---|---|
| Temperature of sample bottle                               | °C | <10                          |          |   |   |
|  | °F | <50                          |          |   |   |
| Temperature of stored sample                               | °C | <10 <sup>a</sup>             | <10      | ambient   | ambient   |
|  | °F | <50 <sup>a</sup>             | <50      | ambient   | ambient   |
| Temperature of sample after conditioning prior to analysis | °C | <10                          | <10      | Ambient or 9 to 21°C above pour point <sup>b</sup>  | Ambient or 48 to 70°F above pour point <sup>b</sup> |
|  | °F | <50                          | <50      | Ambient or 48 to 70°F above pour point <sup>b</sup> | Ambient or 48 to 70°F above pour point <sup>b</sup> |
| If sample is wet   |    | resample                     | resample |   |   |
| If resample is still wet <sup>c</sup>                      |    | dry in accordance with 7.5.2 |          | dry in accordance with 7.5.3                        |   |

<sup>a</sup> Under certain circumstances, samples can also be stored at temperatures below 20°C (68°F). See also 7.3.2 and 7.3.3.<sup>b</sup> If sample is (semi)-solid at ambient temperature, see also 10.3.1.1.<sup>c</sup> If sample is known to be wet, resampling may be omitted. Dry sample in accordance with 7.5.2 and 7.5.3.

as high as the 100-mL mark or the entire receiving cylinder is surrounded by an air circulation chamber.

8.2.1 *Groups 1, 2, and 3*—Suitable media for low temperature baths include, but are not limited to, chopped ice and water, refrigerated brine, and refrigerated ethylene glycol.

8.2.2 *Group 4*—Suitable media for ambient and higher bath temperatures include, but are not limited to, cold water, hot water, and heated ethylene glycol.

8.3 Remove any residual liquid in the condenser tube by swabbing with a piece of soft, lint-free cloth attached to a cord or wire.

## 9. Calibration and Standardization

9.1 *Temperature Measurement System*—Temperature measurement systems using other than the specified mercury-in-glass thermometers shall exhibit the same temperature lag, emergent stem effect, and accuracy as the equivalent mercury-in-glass thermometer. Confirmation of the calibration of these temperature measuring systems shall be made at intervals of not more than six months, and after the system has been replaced or repaired.

9.1.1 The accuracy and the calibration of the electronic circuitry or computer algorithms, or both, shall be verified by the use of a standard precision resistance bench. When performing this verification, no algorithms shall be used to correct the temperature for lag and the emergent stem effect (see manufacturer's instructions).

9.1.2 Verification of the calibration of temperature measuring devices shall be conducted by distilling toluene in accordance with Group 1 of this test method and comparing the 50 % recovered temperature with that shown in Table 4.<sup>5</sup>

9.1.2.1 If the temperature reading is not within the values shown in Table 4 for the respective apparatus being used (see Note 10 and Table 4), the temperature measurement system shall be considered defective and shall not be used for the test.

NOTE 9—Toluene is used as a verification fluid for calibration; it will yield almost no information on how well an electronic measurement system simulates the temperature lag of a liquid-in-glass thermometer.

9.1.2.2 Reagent grade toluene and hexadecane (cetane), conforming to the specifications of the Committee on Analyti-

cal Reagents of the American Chemical Society,<sup>6</sup> shall be used. However, other grades may also be used, provided it is first ascertained that the reagent is of sufficient purity to permit its use without lessening the accuracy of the determination.

NOTE 10—At 101.3 kPa, toluene is shown in reference manuals as boiling at 110.6°C when measured using a partial immersion thermometer. Because this test method uses thermometers calibrated for total immersion, the results typically will be lower and, depending on the thermometer and the situation, may be different for each thermometer. At 101.3 kPa, hexadecane is shown in reference manuals as boiling at 287.0°C when measured using a partial immersion thermometer. Because this test method uses thermometers calibrated for total immersion, the results typically will be lower, and, depending on the thermometer and the situation, may be different for each thermometer.

9.1.3 A procedure to determine the magnitude of the temperature lag is described in Annex A3.

9.1.4 A procedure to emulate the emergent stem effect is described in Appendix X4.

9.1.5 To verify the calibration of the temperature measurement system at elevated temperatures, use hexadecane. The temperature measurement system shall indicate, at 50% recovered, a temperature comparable to that shown in Table 4 for the respective apparatus under Group 4 distillation conditions.

NOTE 11—Because of the high melting point of hexadecane, Group 4 verification distillations will have to be carried out with condenser temperatures >20°C.

### 9.2 Automated Method:

9.2.1 *Level Follower*—For an automated distillation apparatus, the level follower/recording mechanism of the apparatus shall have a resolution of 0.1 mL or better with a maximum error of 0.3 mL between the 5 and 100 mL points. The calibration of the assembly shall be verified in accordance with manufacturer's instructions at intervals of not more than three months and after the system has been replaced or repaired.

NOTE 12—The typical calibration procedure involves verifying the output with the receiver containing 5 and 100 mL of material respectively.

9.2.2 *Barometric Pressure*—At intervals of not more than six months, and after the system has been replaced or repaired,

<sup>5</sup> *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Anal. Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

<sup>5</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D02-1580.



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TABLE 4 True and Min and Max D 86 50 % Recovered Boiling Points (°C)<sup>a</sup>

|            |                            | Manual  |   | Automated   |   |
|------------|----------------------------|---|---|---|---|
|            |                            | Distillation conditions min D 86 50 % boiling point | Distillation conditions max D 86 50 % boiling point | Distillation conditions min D 86 50 % boiling point | Distillation conditions max D 86 50 % boiling point |
| Toluene    | ASTM/IP true boiling point | Group 1, 2, and 3                                   | Group 1, 2, and 3                                   | Group 1, 2, and 3                                   | Group 1, 2, and 3                                   |
|            | 110.6                      | 105.9   | 111.8   | 108.5   | 109.7   |
| Hexadecane | ASTM/IP true boiling point | Group 4   | Group 4   | Group 4   | Group 4   |
|            | 267.0                      | 272.2   | 283.1   | 277.0   | 280.0   |

<sup>a</sup> The manual and automated temperatures shown in this table are the values for the 95 % tolerance interval for the 99 % population coverage. The proposed tolerance is approximately  $3 \times \text{sigma}$ . Information on the values in this table can be found in RR:D02-1580.

the barometric reading of the instrument shall be verified against a barometer, as described in 6.6.

## 10. Procedure

10.1 Record the prevailing barometric pressure.

10.2 *Groups 1 and 2*—Fit a low range thermometer provided with a snug-fitting cork or stopper of silicone rubber, or equivalent polymeric material, tightly into the neck of the sample container and bring the temperature of the sample to the temperature indicated in Table 3.

10.3 *Groups 1, 2, 3, and 4*—Check that the temperature of the sample is as shown in Table 3. Pour the specimen precisely to the 100-mL mark of the receiving cylinder, and transfer the contents of the receiving cylinder as completely as practical into the distillation flask, ensuring that none of the liquid flows into the vapor tube.

NOTE 13—It is important that the difference between the temperature of the specimen and the temperature of the bath around the receiving cylinder is as small as practically possible. A difference of 5°C can make a difference of 0.7 mL.

10.3.1 *Groups 3 and 4*—If the sample is not fluid at ambient temperature, it is to be heated to a temperature between 9 and 21°C above its pour point (Test Methods D 97, D 5949, D 5950, or D 5985) prior to analysis. If the sample has partially or completely solidified in the intervening period, it shall be vigorously shaken after melting, and prior to sampling, to ensure homogeneity.

10.3.1.1 If the sample is not fluid at ambient temperatures, disregard the temperature range shown in Table 1 for the receiving cylinder and sample. Prior to analysis, heat the receiving cylinder to approximately the same temperature as the sample. Pour the heated specimen precisely to the 100-mL mark of the receiving cylinder, and transfer the contents of the receiving cylinder as completely as practical into the distillation flask, ensuring that none of the liquid flows into the vapor tube.

NOTE 14—Any material that evaporates during the transfer will contribute to the loss; any material that remains in the receiving cylinder will contribute to the observed recovery volume at the time of the IBP.

10.4 If the sample can be expected to demonstrate irregular boiling behavior, that is, bumping, add a few boiling chips to the specimen. The addition of a few boiling chips is acceptable for any distillation.

10.5 Fit the temperature sensor through a snug-fitting device, as described in 6.4, to mechanically center the sensor in the neck of the flask. In the case of a thermometer, the bulb is centered in the neck and the lower end of the capillary is level with the highest point on the bottom of the inner wall of the vapor tube (see Fig. 5). In the case of a thermocouple or resistance thermometer, follow the manufacturer's instructions as to placement (see Fig. 6).

NOTE 15—If vacuum grease is used on the mating surface of the centering device, use the minimum amount of grease that is practical.

10.6 Fit the flask vapor tube, provided with a snug-fitting cork or rubber stopper of silicone, or equivalent polymeric material, tightly into the condenser tube. Adjust the flask in a vertical position so that the vapor tube extends into the condenser tube for a distance from 25 to 50 mm. Raise and adjust the flask support board to fit it snugly against the bottom of the flask.

10.7 Place the receiving cylinder that was used to measure the specimen, without drying the inside of the cylinder, into its temperature-controlled bath under the lower end of the condenser tube. The end of the condenser tube shall be centered in the receiving cylinder and shall extend therein for a distance of at least 25 mm, but not below the 100-mL mark.

### 10.8 Initial Boiling Point:

10.8.1 *Manual Method*—To reduce evaporation loss of the distillate, cover the receiving cylinder with a piece of blotting paper, or similar material, that has been cut to fit the condenser tube snugly. If a receiver deflector is being used, start the distillation with the tip of the deflector just touching the wall of the receiving cylinder. If a receiver deflector is not used, keep the drip tip of the condenser away from the wall of the receiving cylinder. Note the start time. Observe and record the IBP to the nearest 0.5°C (1.0°F). If a receiver deflector is not being used, immediately move the receiving cylinder so that the tip of the condenser touches its inner wall.

10.8.2 *Automated Method*—To reduce evaporation loss of the distillate, use the device provided by the instrument manufacturer for this purpose. Apply heat to the distillation flask and contents with the tip of the receiver deflector just touching the wall of the receiving cylinder. Note the start time. Record the IBP to the nearest 0.1°C (0.2°F).

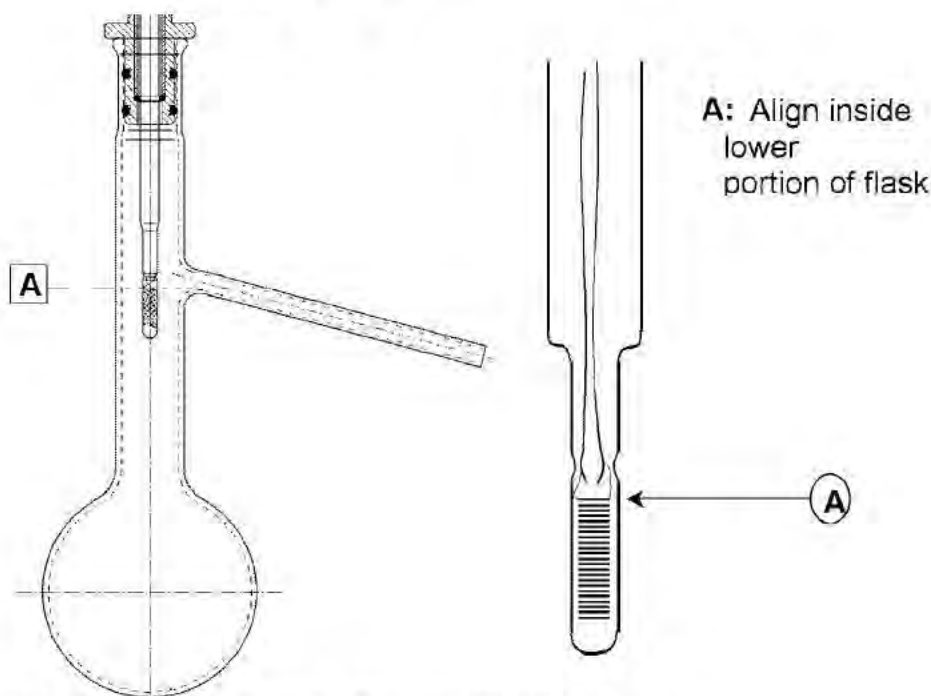


FIG. 6 Example of Recommended Placement of Pt-100 Probe Relative to Distillation Flask Sidearm for Automated D 86 Distillation Instrument

10.9 Regulate the heating so that the time interval between the first application of heat and the IBP is as specified in Table 5.

10.10 Regulate the heating so that the time from IBP to 5 or 10 % recovered is as indicated in Table 5.

10.11 Continue to regulate the heating so that the uniform average rate of condensation from 5 or 10 % recovered to 5 mL residue in the flask is 4 to 5 mL per min. (**Warning**—Due to the configuration of the boiling flask and the conditions of the test, the vapor and liquid around the temperature sensor are not in thermodynamic equilibrium. The distillation rate will consequently have an effect on the measured vapor temperature. The distillation rate shall, therefore, be kept as constant as possible throughout the test.)

NOTE 16—When testing gasoline samples, it is not uncommon to see the condensate suddenly form non-miscible liquid phases and bead up on the temperature measuring device and in the neck of the boiling flask at a vapor temperature of around 160°C. This may be accompanied by a sharp (about 3°C) dip in the vapor temperature and a drop in the recovery rate. The phenomenon, which may be due to the presence of trace water in the sample, may last for 10 to 30 s before the temperature recovers and the condensate starts flowing smoothly again. This point is sometimes colloquially referred to as the Hesitation Point.

10.12 Repeat any distillation that did not meet the requirements described in 10.9, 10.10, and 10.11.

10.13 If a decomposition point, as described in 3.1.3, is observed, discontinue the heating and proceed as directed in 10.17.

10.14 In the interval between the IBP and the end of the distillation, observe and record data necessary for the calculation and reporting of the results of the test as required by the

specification involved, or as previously established for the sample under test. These observed data can include temperature readings at prescribed percentages recovered or percentages recovered at prescribed temperature readings, or both.

10.14.1 *Manual Method*—Record all volumes in the graduated cylinder to the nearest 0.5 mL, and all temperature readings to the nearest 0.5°C (1.0°F).

10.14.2 *Automated Method*—Record all volumes in the receiving cylinder to the nearest 0.1 mL, and all temperature readings to the nearest 0.1°C (0.2°F).

10.14.3 *Group 1, 2, 3, and 4*—In cases in which no specific data requirements have been indicated, record the IBP and the EP (FBP) or the dry point, or both, and temperature readings at 5, 15, 85, and 95 % recovered, and at each 10 % multiple of volume recovered from 10 to 90, inclusive.

10.14.3.1 *Group 4*—When a high range thermometer is used in testing aviation turbine fuels and similar products, pertinent thermometer readings can be obscured by the centering device. If these readings are required, perform a second distillation in accordance with Group 3. In such cases, reading from a low range thermometer can be reported in place of the obscured high range thermometer readings, and the test report shall so indicate. If, by agreement, the obscured readings are waived, the test report shall so indicate.

10.14.4 When it is required to report the temperature reading at a prescribed percent evaporated or recovered for a sample that has a rapidly changing slope of the distillation curve in the region of the prescribed percent evaporated or recovered reading, record temperature readings at every 1 % recovered. The slope is considered rapidly changing if the



TABLE 5 Conditions During Test Procedure

|  |    | Group 1 | Group 2 | Group 3 | Group 4               |
|--|----|---------|---------|---------|-----------------------|
| Temperature of cooling bath <sup>a</sup>   | °C | 0–1     | 0–5     | 0–5     | 0–60                  |
|  | °F | 32–34   | 32–40   | 32–40   | 32–140                |
| Temperature of bath around receiving cylinder                                    | °C | 13–18   | 13–18   | 13–18   | ±3                    |
|  | °F | 55–65   | 55–65   | 55–65   | ±5                    |
|  |    |         |         |         | of charge temperature |
| Time from first application of heat to initial boiling point, min                |    | 5–10    | 5–10    | 5–10    | 5–15                  |
| Time from initial boiling point to 5 % recovered, s                              |    | 60–100  | 60–100  |         |                       |
| to 10 % recovered, min   |    |         |         |         |                       |
| Uniform average rate of condensation from 5 % recovered to 5 mL in flask, mL/min |    | 4–5     | 4–5     | 4–5     | 4–5                   |
| Time recorded from 5 mL residue to end point, min                                |    | 5 max   | 5 max   | 5 max   | 5 max                 |

<sup>a</sup> the proper condenser bath temperature will depend upon the wax content of the sample and of its distillation fractions. The test is generally performed using one single condenser temperature. Wax formation in the condenser can be deduced from (a) the presence of wax particles in the distillate coming off the drip tip, (b) a higher distillation loss than what would be expected based on the initial boiling point of the specimen, (c) an erratic recovery rate and (d) the presence of wax particles during the removal of residual liquid by swabbing with a lint-free cloth (see 8.3). The minimum temperature that permits satisfactory operation shall be used. In general, a bath temperature in the 0 to 4°C range is suitable for kerosine, Grade No. 1 fuel oil and Grade No. 1-D diesel fuel oil. In some cases involving Grade No. 2 fuel oil, Grade No. 2-D diesel fuel oil, gas oils and similar distillates, it may be necessary to hold the condenser bath temperature in the 38 to 60°C range.

change in slope (*C*) of the data points described in 10.14.2 in that particular area is greater than 0.6 (change of slope (*F*) is greater than 1.0) as calculated by Eq 1 (Eq 2).

$$\text{Change of Slope } (C) = \frac{(C_2 - C_1)(V_2 - V_1) - (C_3 - C_2)(V_3 - V_2)}{(V_2 - V_1) - (V_3 - V_2)} \quad (1)$$

$$\text{Change of Slope } (F) = \frac{(F_2 - F_1)(V_2 - V_1) - (F_3 - F_2)(V_3 - V_2)}{(V_2 - V_1) - (V_3 - V_2)} \quad (2)$$

where:

- $C_1$  = temperature at the volume % recorded one reading prior to the volume % in question, °C,
- $C_2$  = temperature at the volume % recorded in question, °C,
- $C_3$  = temperature at the volume % recorded following the volume % in question, °C,
- $F_1$  = temperature at the volume % recorded one reading prior to the volume % in question, °F,
- $F_2$  = temperature at the volume % recorded in question, °F,
- $F_3$  = temperature at the volume % recorded following the volume % in question, °F,
- $V_1$  = volume % recorded one reading prior to the volume % in question,
- $V_2$  = volume % recorded at the volume % in question, and
- $V_3$  = volume % recorded following the volume % in question.

10.15 When the residual liquid in the flask is approximately 5 mL, make a final adjustment of the heat. The time from the 5 mL of liquid residue in the flask to the EP (FBP) shall be within the limits prescribed in Table 5. If this condition is not satisfied, repeat the test with appropriate modification of the final heat adjustment.

NOTE 17—Since it is difficult to determine when there is 5 mL of boiling liquid left in the flask, this time is determined by observing the amount of liquid recovered in the receiving cylinder. The dynamic holdup has been determined to be approximately 1.5 mL at this point. If there are no front end losses, the amount of 5 mL in the flask can be assumed to

correspond with an amount of 93.5 mL in the receiving cylinder. This amount has to be adjusted for the estimated amount of front end loss.

10.15.1 If the actual front end loss differs more than 2 mL from the estimated value, the test shall be rerun.

10.16 Observe and record the EP (FBP) or the dry point, or both, as required, and discontinue the heating.

10.17 Allow the distillate to drain into the receiving cylinder, after heating has been discontinued.

10.17.1 *Manual Method*—While the condenser tube continues to drain into the graduated cylinder, observe and note the volume of condensate to the nearest 0.5 mL at 2 min intervals until two successive observations agree. Measure the volume in the receiving cylinder accurately, and record it to the nearest 0.5 mL.

10.17.2 *Automated Method*—The apparatus shall continually monitor the recovered volume until this volume changes by no more than 0.1 mL in 2 min. Record the volume in the receiving cylinder accurately to the nearest 0.1 mL.

10.18 Record the volume in the receiving cylinder as percent recovery. If the distillation was previously discontinued under the conditions of a decomposition point, deduct the percent recovered from 100, report this difference as the sum of percent residue and percent loss, and omit the procedure given in 10.19.

10.19 After the flask has cooled and no more vapor is observed, disconnect the flask from the condenser, pour its contents into a 5-mL graduated cylinder, and with the flask suspended over the cylinder, allow the flask to drain until no appreciable increase in the volume of liquid in the cylinder is observed. Measure the volume in the graduated cylinder to the nearest 0.1 mL, and record as percent residue.

10.19.1 If the 5-mL graduated cylinder does not have graduations below 1 mL and the volume of liquid is less than 1 mL, prefill the cylinder with 1 mL of a heavy oil to allow a better estimate of the volume of the material recovered.

10.19.1.1 If a residue greater than expected is obtained, and the distillation was not purposely terminated before the EP,



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check whether adequate heat was applied towards the end of the distillation and whether conditions during the test conformed to those specified in Table 5. If not, repeat test.

NOTE 18—The distillation residues of this test method for gasoline, kerosene, and distillate diesel are typically 0.9–1.3, 0.9–1.3, and 1.0–1.4 volume %, respectively.

NOTE 19—The test method is not designed for the analysis of distillate fuels containing appreciable quantities of residual material (see 1.2).

10.19.2 *Groups 1, 2, 3, and 4*—Record the volume in the 5-mL graduated cylinder, to the nearest 0.1 mL, as percent residue.

10.20 If the intent of the distillation is to determine the percent evaporated or percent recovered at a predetermined corrected temperature reading, modify the procedure to conform to the instructions described in Annex A4.

10.21 Examine the condenser tube and the side arm of the flask for waxy or solid deposits. If found, repeat the test after making adjustments described in Footnote A of Table 5.

## 11. Calculations

11.1 The percent total recovery is the sum of the percent recovery (see 10.18) and the percent residue (see 10.19). Deduct the percent total recovery from 100 to obtain the percent loss.

11.2 Do not correct the barometric pressure for meniscus depression, and do not adjust the pressure to what it would be at sea level.

NOTE 20—The observed barometric reading does not have to be corrected to a standard temperature and to standard gravity. Even without performing these corrections, the corrected temperature readings for the same sample between laboratories at two different locations in the world will, in general, differ less than 0.1°C at 100°C. Almost all data obtained earlier have been reported at barometric pressures that have not been corrected to standard temperature and to standard gravity.

11.3 Correct temperature readings to 101.3 kPa (760 mm Hg) pressure. Obtain the correction to be applied to each temperature reading by means of the Sydney Young equation as given in Eq 3, Eq 4, or Eq 5, as appropriate, or by the use of Table 6. For Celsius temperatures:

$$C_c = 0.0009 (101.3 - P_k) (273 + t_c) \quad (3)$$

$$C_c = 0.00012 (760 - P) (273 + t_c) \quad (4)$$

For Fahrenheit temperatures:

$$C_f = 0.00012 (760 - P) (460 + t_f) \quad (5)$$

where:

- $t_c$  = the observed temperature reading in °C,
- $t_f$  = the observed temperature reading in °F,
- $C_c$  and  $C_f$  = corrections to be added algebraically to the observed temperature readings,
- $P_k$  = barometric pressure, prevailing at the time and location of the test, kPa, and
- $P$  = barometric pressure, prevailing at the time and location of the test, mm Hg.

After applying the corrections and rounding each result to the nearest 0.5°C (1.0°F) or 0.1°C (0.2°F), as appropriate to the

TABLE 6 Approximate Thermometer Reading Correction

| Temperature Range |         | Correction <sup>a</sup> per 1.3 kPa (10 mm Hg) Difference in Pressure |      |
|-------------------|---------|---|------|
| °C                | °F      | °C  | °F   |
| 10–30             | 50–86   | 0.35  | 0.63 |
| 30–50             | 86–122  | 0.38  | 0.68 |
| 50–70             | 122–158 | 0.40  | 0.72 |
| 70–90             | 158–194 | 0.42  | 0.76 |
| 90–110            | 194–230 | 0.45  | 0.81 |
| 110–130           | 230–266 | 0.47  | 0.85 |
| 130–150           | 266–302 | 0.50  | 0.89 |
| 150–170           | 302–338 | 0.52  | 0.94 |
| 170–190           | 338–374 | 0.54  | 0.98 |
| 190–210           | 374–410 | 0.57  | 1.02 |
| 210–230           | 410–446 | 0.59  | 1.07 |
| 230–250           | 446–482 | 0.62  | 1.11 |
| 250–270           | 482–518 | 0.64  | 1.15 |
| 270–290           | 518–554 | 0.66  | 1.20 |
| 290–310           | 554–590 | 0.69  | 1.24 |
| 310–330           | 590–626 | 0.71  | 1.28 |
| 330–350           | 626–662 | 0.74  | 1.33 |
| 350–370           | 662–698 | 0.76  | 1.37 |
| 370–390           | 698–734 | 0.78  | 1.41 |
| 390–410           | 734–770 | 0.81  | 1.46 |

<sup>a</sup> Values to be added when barometric pressure is below 101.3 kPa (760 mm Hg) and to be subtracted when barometric pressure is above 101.3 kPa.

apparatus being used, use the corrected temperature readings in all further calculations and reporting.

NOTE 21—Temperature readings are not corrected to 101.3 kPa (760 mm Hg) when product definitions, specifications, or agreements between the parties involved indicate, specifically, that such correction is not required or that correction shall be made to some other base pressure.

11.4 Correct the actual loss to 101.3 kPa (760 mm Hg) pressure when temperature readings are corrected to 101.3 kPa pressure. The corrected loss,  $L_c$ , is calculated from Eq 6 or Eq 7, as appropriate, or can be read from the tables presented as Fig. X3.1 or Fig. X3.2.

$$L_c = 0.5 + (L - 0.5) \{1 + (101.3 - P_k)/8.00\} \quad (6)$$

$$L_c = 0.5 + (L - 0.5) \{1 + (760 - P)/60.0\} \quad (7)$$

where:

- $L$  = observed loss,
- $L_c$  = corrected loss,
- $P_k$  = pressure, kPa, and
- $P$  = pressure, mm Hg.

NOTE 22—Eq 6 and 7 above have been derived from the data in Table 7 and Eqs 5 and 6 in Test Method D 86 – 95 and earlier versions. It is probable that Eq 6 and 7 shown were the original empirical equations from which the table and equations in the Test Method D 86 – 95 and earlier versions were derived.

11.4.1 Calculate the corresponding corrected percent recovery in accordance with the following equation:

$$R_c = R + (L - L_c) \quad (8)$$

where:

- $L$  = percent loss or observed loss,
- $L_c$  = corrected loss,
- $R$  = percent recovery, and
- $R_c$  = corrected percent recovery.



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TABLE 7 Data Points for Determining Slope,  $S_C$  or  $S_F$ 

| Slope at %  | IBP | 5  | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | EP            |
|-------------|-----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| $T_L$ at %  | 0   | 0  | 0  | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95            |
| $T_U$ at %  | 5   | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 90 | 95 | $V_{EP}$      |
| $V_U - V_L$ | 5   | 10 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 5  | $V_{EP} - 95$ |

11.5 To obtain the percent evaporated at a prescribed temperature reading, add the percent loss to each of the observed percent recovered at the prescribed temperature readings, and report these results as the respective percent evaporated, that is:

$$P_e = P_r + L \quad (9)$$

where:

$L$  = observed loss,

$P_e$  = percent evaporated, and

$P_r$  = percent recovered.

11.6 To obtain temperature readings at prescribed percent evaporated, and if no recorded temperature data is available within 0.1 volume % of the prescribed percent evaporated, use either of the two following procedures, and indicate on the report whether the arithmetical procedure or the graphical procedure has been used.

11.6.1 *Arithmetical Procedure*—Deduct the observed loss from each prescribed percent evaporated to obtain the corresponding percent recovered. Calculate each required temperature reading as follows:

$$T = T_L + (T_H - T_L)(R - R_L)/(R_H - R_L) \quad (10)$$

where:

$R$  = percent recovered corresponding to the prescribed percent evaporated,

$R_H$  = percent recovered adjacent to, and higher than  $R$ ,

$R_L$  = percent recovered adjacent to, and lower than  $R$ ,

$T$  = temperature reading at the prescribed percent evaporated,

$T_H$  = temperature reading recorded at  $R_H$ , and

$T_L$  = temperature reading recorded at  $R_L$ .

Values obtained by the arithmetical procedure are affected by the extent to which the distillation graphs are nonlinear. Intervals between successive data points can, at any stage of the test, be no wider than the intervals indicated in 10.18. In no case shall a calculation be made that involves extrapolation.

11.6.2 *Graphical Procedure*—Using graph paper with uniform subdivisions, plot each temperature reading corrected for barometric pressure, if required (see 11.3), against its corresponding percent recovered. Plot the IBP at 0 % recovered. Draw a smooth curve connecting the points. For each prescribed percent evaporated, deduct the distillation loss to obtain the corresponding percent recovered and take from the graph the temperature reading that this percent recovered indicates. Values obtained by graphical interpolation procedures are affected by the care with which the plot is made.

NOTE 23—See Appendix X1 for numerical examples illustrating the arithmetical procedure.

11.6.3 In most automated instruments, temperature-volume data are collected at 0.1 volume % intervals or less and stored in memory. To report a temperature reading at a prescribed percent evaporated, neither of the procedures described in 11.6.1 and 11.6.2 have to be used. Obtain the desired temperature directly from the database as the temperature closest to and within 0.1 volume % of the prescribed percent evaporated.

## 12. Report

12.1 Report the following information (see Appendix X5 for examples of reports):

12.2 Report the barometric pressure to the nearest 0.1 kPa (1 mm Hg).

12.3 Report all volumetric readings in percentages.

12.3.1 *Manual Method*—Report volumetric readings to the nearest 0.5, and all temperature readings to the nearest 0.5°C (1.0°F).

12.3.2 *Automated Method*—Report volumetric readings to the nearest 0.1, and all temperature readings to the nearest 0.1°C (0.2°F) or less.

12.4 After barometric corrections of the temperature readings have been made, the following data require no further calculation prior to reporting: IBP, dry point, EP (FBP), decomposition point, and all pairs of corresponding values involving percent recovered and temperature readings.

12.4.1 The report shall state if the temperature readings have not been corrected for barometric pressure.

12.5 When the temperature readings have not been corrected to 101.3 kPa (760 mm Hg) pressure, report the percent residue and percent loss as *observed* in accordance with 10.19 and 11.1, respectively.

12.6 Do not use the corrected loss in the calculation of percent evaporated.

12.7 It is advisable to base the report on relationships between temperature readings and percent evaporated when the sample is a gasoline, or any other product classified under Group I, or in which the percent loss is greater than 2.0. Otherwise, the report can be based on relationships between temperature readings and percent evaporated or percent recovered. Every report must indicate clearly which basis has been used.

12.7.1 In the manual method, if results are given in percent evaporated versus temperature readings, report if the arithmetical or the graphical procedure was used (see 11.6).

12.8 Report if a drying agent, as described in 7.5.2 or 7.5.3, was used.

12.9 Fig. X1.1 is an example of a tabular report. It shows the percent recovered versus the corresponding temperature reading and versus the corrected temperature reading. It also shows the percent loss, the corrected loss, and the percent evaporated versus the corrected temperature reading.



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TABLE 8 Repeatability and Reproducibility for Group 1

| Evaporated Point, % | Manual Repeatability <sup>a</sup> |                        | Manual Reproducibility <sup>a</sup> |                        | Automated Repeatability <sup>a</sup> |                        | Automated Reproducibility <sup>a</sup> |                       |
|---------------------|-----------------------------------|------------------------|-------------------------------------|------------------------|--------------------------------------|------------------------|--|-----------------------|
|                     | °C                                | °F                     | °C                                  | °F                     | °C                                   | °F                     | °C                                     | °F                    |
| IBP                 | 3.3                               | 6                      | 5.6                                 | 10                     | 3.9                                  | 7                      | 7.2                                    | 13                    |
| 5                   | 1.9+0.86S <sub>C</sub>            | 3.4+0.86S <sub>F</sub> | 3.1+1.74S <sub>C</sub>              | 5.6+1.74S <sub>F</sub> | 2.1+0.67S <sub>C</sub>               | 3.8+0.67S <sub>F</sub> | 4.4+2.0S <sub>C</sub>                  | 7.9+2.0S <sub>F</sub> |
| 10                  | 1.2+0.86S <sub>C</sub>            | 2.2+0.86S <sub>F</sub> | 2.0+1.74S <sub>C</sub>              | 3.6+1.74S <sub>F</sub> | 1.7+0.67S <sub>C</sub>               | 3.0+0.67S <sub>F</sub> | 3.3+2.0S <sub>C</sub>                  | 6.0+2.0S <sub>F</sub> |
| 20                  | 1.2+0.86S <sub>C</sub>            | 2.2+0.86S <sub>F</sub> | 2.0+1.74S <sub>C</sub>              | 3.6+1.74S <sub>F</sub> | 1.1+0.67S <sub>C</sub>               | 2.0+0.67S <sub>F</sub> | 3.3+2.0S <sub>C</sub>                  | 6.0+2.0S <sub>F</sub> |
| 30–70               | 1.2+0.86S <sub>C</sub>            | 2.2+0.86S <sub>F</sub> | 2.0+1.74S <sub>C</sub>              | 3.6+1.74S <sub>F</sub> | 1.1+0.67S <sub>C</sub>               | 2.0+0.67S <sub>F</sub> | 2.6+2.0S <sub>C</sub>                  | 4.7+2.0S <sub>F</sub> |
| 80                  | 1.2+0.86S <sub>C</sub>            | 2.2+0.86S <sub>F</sub> | 2.0+1.74S <sub>C</sub>              | 3.6+1.74S <sub>F</sub> | 1.1+0.67S <sub>C</sub>               | 2.0+0.67S <sub>F</sub> | 1.7+2.0S <sub>C</sub>                  | 3.0+2.0S <sub>F</sub> |
| 90                  | 1.2+0.86S <sub>C</sub>            | 2.2+0.86S <sub>F</sub> | 0.8+1.74S <sub>C</sub>              | 1.4+1.74S <sub>F</sub> | 1.1+0.67S <sub>C</sub>               | 2.0+0.67S <sub>F</sub> | 0.7+2.0S <sub>C</sub>                  | 1.2+2.0S <sub>F</sub> |
| 95                  | 1.2+0.86S <sub>C</sub>            | 2.2+0.86S <sub>F</sub> | 1.1+1.74S <sub>C</sub>              | 1.9+1.74S <sub>F</sub> | 2.5+0.67S <sub>C</sub>               | 4.5+0.67S <sub>F</sub> | 2.6+2.0S <sub>C</sub>                  | 4.7+2.0S <sub>F</sub> |
| FBP                 | 3.9                               | 7                      | 7.2                                 | 13                     | 4.4                                  | 8                      | 8.9                                    | 16                    |

<sup>a</sup> S<sub>C</sub> or S<sub>F</sub> is the average slope (or rate of change) calculated in accordance with 13.2.

### 13. Precision and Bias

#### 13.1 Precision:

13.1.1 The precision of this test method has been determined by the statistical examination of interlaboratory test results obtained by 26 laboratories on 14 gasolines, by 4 laboratories on 8 samples of kerosine by the manual procedure, 3 laboratories on 6 samples of kerosine by the automated procedure, and 5 laboratories on 10 samples of diesel fuel by both the manual and automated procedures. Table A1.1 lists which tables and figures are to be used for the different fuel groups, distillation methods, and temperature scales.

13.1.2 The following terms are used in this section: (1) *r* = repeatability and (2) *R* = reproducibility. The value of any of these terms will depend upon whether the calculations were carried out in °C or °F.

#### 13.2 Slope or Rate of Change of Temperature:

13.2.1 To determine the precision of a result, it is generally necessary to determine the slope or rate of change of the temperature at that particular point. This variable, denoted as S<sub>C</sub> or S<sub>F</sub>, is equal to the change in temperature, either in °C or in °F, respectively, per percent recovered or evaporated.

13.2.2 For Group 1 in the manual method and for all groups in the automated method, the precision of the IBP and EP does not require any slope calculation.

13.2.3 With the exception stated in 13.2.2 and in 13.2.4, the slope at any point during the distillation is calculated from the following equations, using the values shown in Table 7:

$$S_C \text{ (or } S_F) = (T_U - T_L) / (V_U - V_L) \quad (11)$$

where:

S<sub>C</sub> = is the slope, °C/volume %.

S<sub>F</sub> = is the slope, °F/volume %.

T<sub>U</sub> = is the upper temperature, °C (or °F),

T<sub>L</sub> = is the lower temperature, °C (or °F),

V<sub>U</sub> = is the volume % recovered or evaporated corresponding to T<sub>U</sub>,

V<sub>L</sub> = is the volume % recovered or evaporated corresponding to T<sub>L</sub>, and

V<sub>EP</sub> = is the volume % recovered or evaporated corresponding to the end point.

13.2.4 In the event that the distillation end point occurs prior to the 95 % point, the slope at the end point is calculated as follows:

$$S_C \text{ (or } S_F) = (T_{EP} - T_{HR}) / (V_{EP} - V_{HR}) \quad (12)$$

where:

T<sub>EP</sub> or T<sub>HR</sub> is the temperature, in °C or °F at the percent volume recovered indicated by the subscript,

V<sub>EP</sub> or V<sub>HR</sub> is the volume % recovered.

13.2.4.1 The subscripts in Eq 12 refer to:

EP = end point

HR = highest reading, either 80 % or 90 %, prior to the end point.

13.2.5 For points between 10 to 85 % recovered which are not shown in Table 7, the slope is calculated as follows:

$$S_C \text{ (or } S_F) = 0.05 (T_{(V+10)} - T_{(V-10)}) \quad (13)$$

13.2.6 For samples in Group 1, the precision data reported are based on slope values calculated from percent evaporated data.

13.2.7 For samples in Group 2, 3, and 4, the precision data reported (Table 8) are based on slope values calculated from percent recovered data.

13.2.8 When results are reported as volume % recovered, slope values for the calculation of precision are to be determined from percent recovered data; when results are reported as volume % evaporated slope values are to be determined from % evaporated data.

#### 13.3 Manual Method:

##### 13.3.1 Repeatability:

13.3.1.1 **GROUP 1**—The difference between successive results obtained by the same operator with the same apparatus under constant operating conditions on identical test material would, in the long run, in the normal and correct operation of this test method, exceed the values calculated from Table 9 in only one case in twenty.

13.3.1.2 **GROUPS 2, 3, and 4**—The difference between successive results obtained by the same operator with the same apparatus under constant operating conditions on identical test material would, in the long run, in the normal and correct operation of this test method, exceed the values calculated from the values in Table 9 in only one case in twenty.

##### 13.3.2 Reproducibility:



TABLE 9 Repeatability and Reproducibility for Groups 2, 3 and 4 (Manual Method)

|                                 | Repeatability <sup>a</sup> |                         | Reproducibility <sup>a</sup> |                          |
|---------------------------------|----------------------------|-------------------------|------------------------------|--------------------------|
|                                 | °C                         | °F                      | °C                           | °F                       |
| IBP                             | 1.0+0.35S <sub>C</sub>     | 1.9+0.35S <sub>F</sub>  | 2.8+0.93S <sub>C</sub>       | 5.0+0.93S <sub>F</sub>   |
| 5–95 %                          | 1.0+0.41S <sub>C</sub>     | 1.8+0.41S <sub>F</sub>  | 1.8+1.33S <sub>C</sub>       | 3.3+1.33S <sub>F</sub>   |
| FBP                             | 0.7+0.36S <sub>C</sub>     | 1.3+0.36S <sub>F</sub>  | 3.1+0.42S <sub>C</sub>       | 5.7+0.42S <sub>F</sub>   |
| % volume at temperature reading | 0.7+0.92/S <sub>C</sub>    | 0.7+1.66/S <sub>F</sub> | 1.5+1.78/S <sub>C</sub>      | 1.53+3.20/S <sub>F</sub> |

<sup>a</sup> Calculate S<sub>C</sub> or S<sub>F</sub> from 13.2.

13.3.2.1 *GROUP 1*—The difference between two single and independent results obtained by different operators working in different laboratories on identical test material would, in the normal and correct operation of this method, exceed the values calculated from Table 9 in only one case in twenty.<sup>7</sup>

13.3.2.2 *GROUPS 2, 3, and 4*—The difference between two single and independent results obtained by different operators working in different laboratories on identical test material would, in the normal and correct operation of this test method, exceed the values calculated from the data in Table 9 in only one case in twenty.<sup>8</sup>

#### 13.4 Automated Method:

##### 13.4.1 Repeatability:

13.4.1.1 *GROUP 1*—The difference between successive results obtained by the same operator with the same apparatus under constant operating conditions on identical test material would, in the long run, in the normal and correct operation of this test method, exceed the values calculated from Table 8 in only one case in twenty.

13.4.1.2 *GROUPS 2, 3, and 4*—The difference between successive results obtained by the same operator with the same apparatus under constant operating conditions on identical test material would, in the long run, in the normal and correct operation of this test method, exceed the values calculated from Table 10 in only one case in twenty.

##### 13.4.2 Reproducibility:

<sup>7</sup> Precision data obtained from RR study on both manual and automated D 86 units by North American and IP Laboratories.

<sup>8</sup> Table 9 has been derived from the nomographs in Figs. 6 and 7 in ASTM D 86-97.

13.4.2.1 *GROUP 1*—The difference between two single and independent results obtained by different operators working in different laboratories on identical test material would, in the normal and correct operation of this test method, exceed the values calculated from Table 8 in only one case in twenty.<sup>7</sup>

13.4.2.2 *GROUPS 2, 3, and 4*—The difference between two single and independent results obtained by different operators working in different laboratories on identical test material would, in the normal and correct operation of this test method, exceed the values calculated from Table 10 in only one case in twenty.

#### 13.5 Bias:

13.5.1 *Bias*—Due to the use of total immersion thermometers, or temperature sensing systems designed to emulate them, the distillation temperatures in this test method are somewhat lower than the true temperatures. The amount of bias depends on the product being distilled and the thermometer used.

13.5.2 *Relative Bias*—There exists a bias between the empirical results of distillation properties obtained by this test method and the true boiling point distillation curve obtained by Test Method D 2892. The magnitude of this bias, and how it relates to test precision, has not been rigorously studied.

13.5.3 *Relative Bias*—An interlaboratory study<sup>5</sup> conducted in 2003 using manual and automated apparatus has concluded that there is no statistical evidence to suggest that there is a bias between manual and automated results.

## 14. Keywords

14.1 batch distillation; distillates; distillation; laboratory distillation; petroleum products



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TABLE 10 Repeatability and Reproducibility for Groups 2, 3 and 4 (Automated)

| Collected, % | Repeatability <sup>a</sup> |                          | Reproducibility <sup>a</sup> |                          |
|--------------|----------------------------|--------------------------|------------------------------|--------------------------|
|              | °C                         | °F                       | °C                           | °F                       |
| IBP          | 3.5                        | 6.3                      | 8.5                          | 15.3                     |
| 2 %          | 3.5                        | 6.3                      | 2.6 + 1.92S <sub>C</sub>     | 4.7 + 1.92S <sub>F</sub> |
| 5 %          | 1.1 + 1.08S <sub>C</sub>   | 2.0 + 1.08S <sub>F</sub> | 2.0 + 2.53S <sub>C</sub>     | 3.6 + 2.53S <sub>F</sub> |
| 10 %         | 1.2 + 1.42S <sub>C</sub>   | 2.2 + 1.42S <sub>F</sub> | 3.0 + 2.64S <sub>C</sub>     | 5.4 + 2.64S <sub>F</sub> |
| 20–70 %      | 1.2 + 1.42S <sub>C</sub>   | 2.2 + 1.42S <sub>F</sub> | 2.9 + 3.97S <sub>C</sub>     | 5.2 + 3.97S <sub>F</sub> |
| 80 %         | 1.2 + 1.42S <sub>C</sub>   | 2.2 + 1.42S <sub>F</sub> | 3.0 + 2.64S <sub>C</sub>     | 5.4 + 2.64S <sub>F</sub> |
| 90–95 %      | 1.1 + 1.08S <sub>C</sub>   | 2.0 + 1.08S <sub>F</sub> | 2.0 + 2.53S <sub>C</sub>     | 3.6 + 2.53S <sub>F</sub> |
| FBP          | 3.5                        | 6.3                      | 10.5                         | 18.9                     |

<sup>a</sup> S<sub>C</sub> or S<sub>F</sub> is the average slope (or rate of change) calculated in accordance with 13.5.

## ANNEXES

## (Mandatory Information)

## A1. REPEATABILITY AND REPRODUCIBILITY DEFINITION AIDS

A1.1 Table A1.1 is an aid for determining which repeatability and reproducibility table or section, is to be used.

TABLE A1.1 Summary of Aids for Definition of Repeatability and Reproducibility

| Group | Method    | Temperature Scale | Table or Section to Use |                 |
|-------|-----------|-------------------|-------------------------|-----------------|
|       |           |                   | Repeatability           | Reproducibility |
| 1     | Manual    | °C                | Table 8                 | Table 8         |
|       |           | °F                | Table 8                 | Table 8         |
| 1     | Automated | °C                | Table 8                 | Table 8         |
|       |           | °F                | Table 8                 | Table 8         |
| 2,3,4 | Manual    | °C                | Table 9                 | Table 9         |
|       |           | °F                | Table 9                 | Table 9         |
| 2,3,4 | Automated | °C                | Table 10                | Table 10        |
|       |           | °F                | Table 10                | Table 10        |

## A2. DETAILED DESCRIPTION OF APPARATUS

A2.1 *Distillation Flasks*—Flasks shall be of heat resistant glass, constructed to the dimensions and tolerances shown in Fig. A2.1 and shall otherwise comply with the requirements of Specification E 1405. Flask A (100 mL) may also be constructed with a ground glass joint, in which case the diameter of the neck shall be the same as the 125-mL flask.

NOTE A2.1—For tests specifying dry point, specially selected flasks with bottoms and walls of uniform thickness are desirable.

A2.2 *Condenser and Condenser Bath*—Typical types of condenser and condenser baths are illustrated in Figs. 1 and 2.

A2.2.1 The condenser shall be made of seamless noncorrosive metal tubing, 560 ± 5 mm in length, with an outside diameter of 14 mm and a wall thickness of 0.8 to 0.9 mm.

NOTE A2.2—Brass or stainless steel has been found to be a suitable material for this purpose.

A2.2.2 The condenser shall be set so that 393 ± 3 mm of the tube is in contact with the cooling medium, with 50 ± 3 mm outside the cooling bath at the upper end, and with 114 ± 3 mm outside at the lower end. The portion of the tube projecting at the upper end shall be set at an angle of 75 ± 3° with the vertical. The portion of the tube inside the condenser bath shall be either straight or bent in any suitable continuous smooth curve. The average gradient shall be 15 ± 1° with respect to the horizontal, with no 10-cm section having a gradient outside of the 15 ± 3° range. The projecting lower portion of the condenser tube shall be curved downward for a length of 76 mm and the lower end shall be cut off at an acute angle. Provisions shall be made to enable the flow of the distillate to run down the side of the receiving cylinder. This can be accomplished by using a drip-deflector, which is attached to the outlet of the tube. Alternatively, the lower portion of the condenser tube can be curved slightly backward to ensure

contact with the wall of the receiving cylinder at a point 25 to 32 mm below the top of the receiving cylinder. Fig. A2.3 is a drawing of an acceptable configuration of the lower end of the condenser tube.

A2.2.3 The volume and the design of the bath will depend on the cooling medium employed. The cooling capacity of the bath shall be adequate to maintain the required temperature for the desired condenser performance. A single condenser bath may be used for several condenser tubes.

A2.3 *Metal Shield or Enclosure for Flask.* (Manual units only).

A2.3.1 *Shield for Gas Burner* (see Fig. 1)—The purpose of this shield is to provide protection for the operator and yet allow easy access to the burner and to the distillation flask during operation. A typical shield would be 480-mm high, 280-mm long and 200-mm wide, made of sheet metal of 0.8-mm thickness (22 gauge). The shield shall be provided with at least one window to observe the dry point at the end of the distillation.

A2.3.2 *Shield for Electric Heater* (see Fig. 2)—A typical shield would be 440-mm high, 200-mm long, and 200-mm wide, made of sheet metal of approximately 0.8-mm thickness (22 gauge) and with a window in the front side. The shield shall be provided with at least one window to observe the dry point at the end of the distillation.

A2.4 *Heat Source:*

A2.4.1 *Gas Burner* (see Fig. 1), capable of bringing over the first drop from a cold start within the time specified and of continuing the distillation at the specified rate. A sensitive manual control valve and gas pressure regulator to give complete control of heating shall be provided.

A2.4.2 *Electric Heater* (see Fig. 2), of low heat retention.

NOTE A2.3—Heaters, adjustable from 0 to 1000 W, have been found to be suitable for this purpose.

A2.5 *Flask Support:*

A2.5.1 *Type 1*—Use a Type 1 flask support with a gas burner (see Fig. 1). This support consists of either a ring support of the ordinary laboratory type, 100 mm or larger in diameter, supported on a stand inside the shield, or a platform adjustable from the outside of the shield. On this ring or platform is mounted a hard board made of ceramic or other heat-resistant material, 3 to 6 mm in thickness, with a central opening 76 to 100 mm in diameter, and outside line dimensions slightly smaller than the inside boundaries of the shield.

A2.5.2 *Type 2*—Use a Type 2 flask support assembly with electric heating (see Fig. 2 as one example). The assembly consists of an adjustable system onto which the electric heater is mounted with provision for placement of a flask support board (see A2.6) above the electric heater. The whole assembly is adjustable from the outside of the shield.

A2.6 *Flask Support Board*—The flask support board shall be constructed of ceramic or other heat-resistant material, 3 to 6 mm in thickness. Flask support boards are classified as A, B, or C, based on the size of the centrally located opening, the dimension of which is shown in Table 1. The flask support board shall be of sufficient dimension to ensure that thermal heat to the flask only comes from the central opening and that extraneous heat to the flask other than through the central opening is minimized. (**Warning**—Asbestos-containing materials shall not be used in the construction of the flask support board.)

A2.7 The flask support board can be moved slightly in different directions on the horizontal plane to position the distillation flask so that direct heat is applied to the flask only through the opening in this board. Usually, the position of the flask is set by adjusting the length of the side-arm inserted into the condenser.

A2.8 Provision shall be made for moving the flask support assembly vertically so that the flask support board is in direct contact with the bottom of the distillation flask during the distillation. The assembly is moved down to allow for easy mounting and removal of the distillation flask from the unit.

A2.9 *Receiving Cylinders*—The receiving cylinder shall have a capacity to measure and collect 100 mL. The shape of the base shall be such that the receiver does not topple when placed empty on a surface inclined at an angle of 13° from the horizontal.

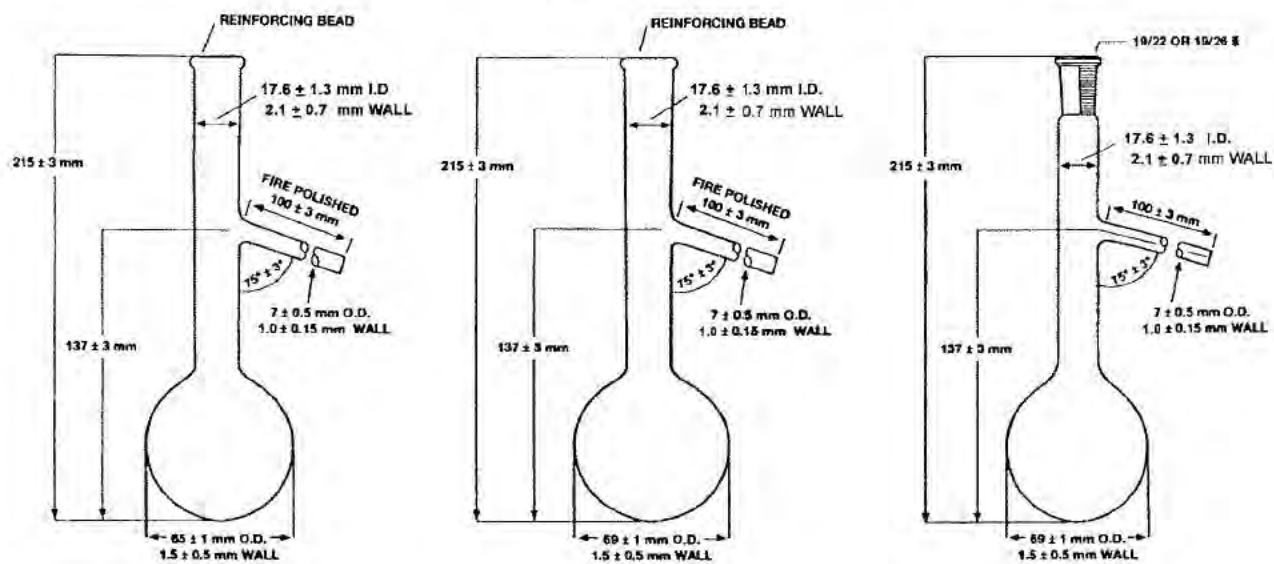
A2.9.1 *Manual Method*—The cylinder shall be graduated at intervals of 1 mL and have a graduation at the 100-mL mark. Construction details and tolerances for the graduated cylinder are shown in Fig. A2.4.

A2.9.2 *Automated Method*—The cylinder shall conform to the physical specifications described in Fig. A2.4, except that graduations below the 100-mL mark are permitted, as long as they do not interfere with the operation of the level follower. Receiving cylinders for use in automated units may also have a metal base.

A2.9.3 If required, the receiving cylinder shall be immersed during the distillation to above the 100-mL graduation line in a cooling liquid contained in a cooling bath, such as a tall-form beaker of clear glass or transparent plastic. Alternatively, the receiving cylinder may be placed in a thermostated bath air circulation chamber.

A2.10 *Residue Cylinder*—The graduated cylinder shall have a capacity of 5 or 10 mL, with graduations into 0.1 mL subdivisions, beginning at 0.1 mL. The top of the cylinder may be flared, the other properties shall conform to Specification E 1272.

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Flask A, 100 mL

Flask B, 125 mL

Flask B, 125 mL

FIG. A2.1 Flask A, 100 mL, Flask B, 125 mL, and Flask B with Ground Glass Joint, 125 mL

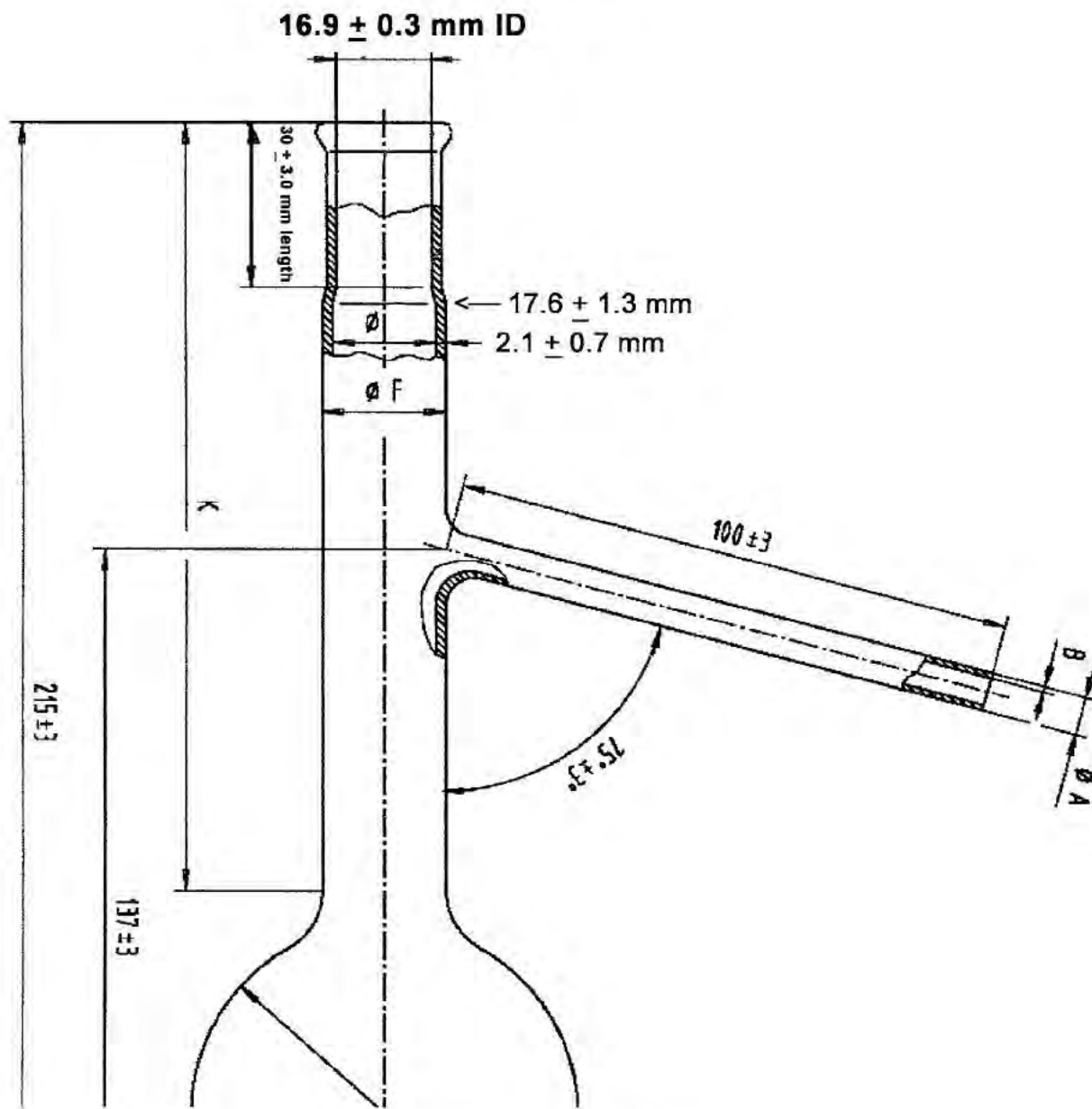
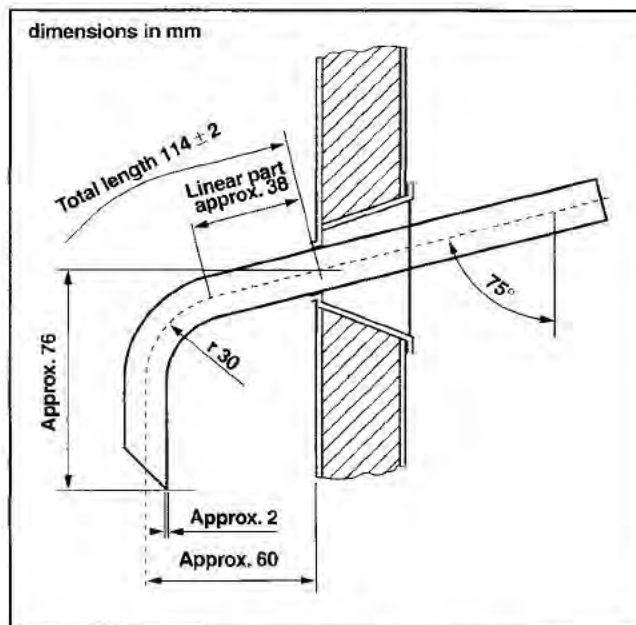
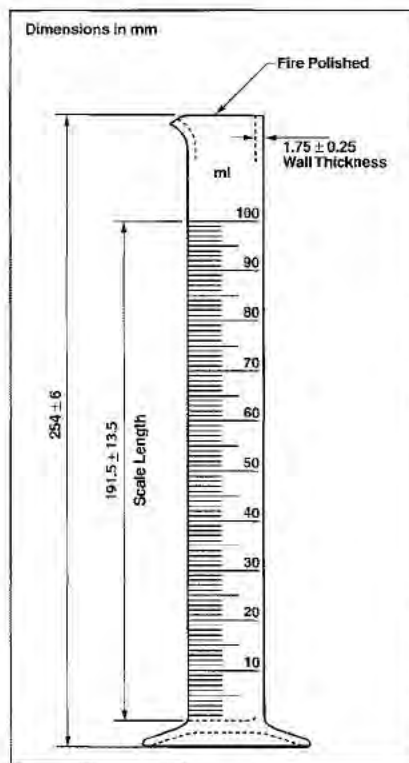


FIG. A2.2 Detail of Upper Neck Section

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**Lower End of Condenser Tube**  
 FIG. A2.3 Lower End of Condenser Tube



Note—1 to 100 mL in 1 mL graduations; tolerance  $\pm 1.0$  mL.

**FIG. A2.4 100 mL Graduated Cylinder**

### A3. DETERMINATION OF THE DIFFERENCE IN LAG TIME BETWEEN AN ELECTRONIC TEMPERATURE MEASUREMENT SYSTEM AND A MERCURY-IN-GLASS THERMOMETER

A3.1 The response time of an electronic temperature measuring device is inherently more rapid than that of a mercury-in-glass thermometer. The temperature measuring device assembly in general use, consisting of the sensor and its casing, or an electronic system and its associated software, or both, is so designed that the temperature measuring system will simulate the temperature lag of the mercury-in-glass thermometer.

A3.2 To determine the difference in lag time between such a temperature measuring system and a mercury-in-glass thermometer, analyze a sample such as gasoline, kerosine, jet fuel, or light diesel fuel with the electronic temperature measurement system in place and in accordance with the procedures described in this test method. In most cases this is the standard distillation step performed with an automated unit.

A3.2.1 Do not use a single pure compound, a very narrow boiling range product, or a synthetic blend of less than six compounds for this test.

A3.2.2 Best results are obtained with a sample that is typical of the sample load of the laboratory. Alternatively, use a full-range mixture with a 5 to 95 % boiling range of at least 100°C.

A3.3 Replace the electronic temperature measuring device with a low range or a high range mercury-in-glass thermometer, depending on the boiling range of the sample.

A3.4 Repeat the distillation with this thermometer, and manually record the temperature at the various percent recovered as described in 10.14.

A3.5 Calculate the values for the repeatability for the observed slope ( $\Delta T/\Delta V$ ) for the different readings in the test.

A3.6 Compare the test data obtained using these two temperature measuring devices. The difference at any point shall be equal to, or less than, the repeatability of the method at that point. If this difference is larger, replace the electronic temperature measuring device or adjust the electronics involved, or both.

### A4. PROCEDURE TO DETERMINE THE PERCENT EVAPORATED OR PERCENT RECOVERED AT A PRESCRIBED TEMPERATURE READING

A4.1 Many specifications require specific percentages evaporated or recovered at prescribed temperature readings, either as maxima, minima, or ranges. The procedures to determine these values are frequently designated by the terms Exxx or Rxxx, where xxx is the desired temperature.

NOTE A4.1—Regulatory standards on the certification of reformulated gasoline under the complex model procedure require the determination of E 200 and E 300, defined as the percent evaporated fuel at 93.3°C (200°F) and 148.9°C (300°F), respectively. E 158, the percent evaporated at a distillation temperature of 70°C (158°F), is also used in describing fuel volatility characteristics. Other typical temperatures are R 200 for kerosines and R 250 and R 350 for gas oils, where R 200, R 250, and R 350 are the percent recovered fuel at 200°C, 250°C, and 350°C, respectively.

A4.2 Determine the barometric pressure, and calculate the correction to the desired temperature reading using Eq 3, Eq 4, or Eq 5 for  $t = xxx^{\circ}\text{C}$  (or  $t_f = xxx^{\circ}\text{F}$ ).

A4.2.1 *Manual Method*—Determine this correction to 0.5°C (1°F).

A4.2.2 *Automated Method*—Determine this correction to 0.1°C (0.2°F).

A4.3 Determine the expected temperature reading to yield  $xxx^{\circ}\text{C}$  (or  $xxx^{\circ}\text{F}$ ) after the barometric correction. To obtain the expected value, add the absolute value of the calculated correction to the desired temperature if the barometric pressure is above 101.3 kPa. If the barometric pressure is below 101.3 kPa, subtract the absolute value of the calculated correction from the desired temperature.

A4.4 Perform the distillation, as described in Section 10,

while taking into account A4.5 and A4.6.

#### A4.5 *Manual Distillation:*

A4.5.1 In the region between about 10°C below and 10°C above the desired expected temperature reading determined in A4.3 record the temperature reading in intervals of 1 volume %.

A4.5.2 If the intent of the distillation is to solely determine the value of Exxx or Rxxx, discontinue the distillation after at least another 2 mL of distillate have been collected. Otherwise, continue the distillation, as described in Section 10, and determine the observed loss, as described in 11.1.

A4.5.2.1 If the intent of the distillation is to determine the value of Exxx and the distillation was terminated after about 2 mL of distillate was collected beyond the desired temperature, allow the distillate to drain into the receiving graduate. Allow the contents of the flask to cool to below approximately 40°C and then drain its contents into the receiving graduate. Note the volume of product in the receiving graduate to the nearest 0.5 mL at 2 min intervals until two successive observations agree.

A4.5.2.2 The amount recovered in the receiving graduate is the percent recovery. Determine the amount of observed loss by subtracting the percent recovery from 100.0.

#### A4.6 *Automated Distillation:*

A4.6.1 In the region between about 10°C below and 10°C above the desired expected temperature reading determined in A4.3, collect temperature-volume data at 0.1 volume % intervals or less.



A4.6.2 Continue the distillation, as described in Section 10, and determine the percent loss, as described in 11.1.

#### A4.7 Calculations:

A4.7.1 *Manual Method*—If a volume % recovered reading is not available at the exact temperature calculated in A4.3, determine the percent recovered by interpolation between the two adjacent readings. Either the linear, as described in 11.6.1, or the graphical procedure, as described in 11.6.2, is permitted. The percent recovered is equal to Rxxx.

A4.7.2 *Automated Method*—Report the observed volume to 0.1 volume % corresponding to the temperature closest to the expected temperature reading. This is the percent recovered, or Rxxx.

A4.7.3 *Manual and Automated Methods*—To determine the value of Exxx, add the observed loss to the percent recovered, Rxxx, as determined in A4.7.1 or A4.7.2 and as described in Eq 9.

A4.7.3.1 As prescribed in 12.6, do not use the corrected loss.

#### A4.8 Precision:

A4.8.1 The statistical determination of the precision of the volume % evaporated or recovered at a prescribed temperature has not been directly measured in an interlaboratory program. It can be shown that the precision of the volume % evaporated or recovered at a prescribed temperature is equivalent to the precision of the temperature measurement at that point divided by the rate of change of temperature versus volume % evaporated or recovered. The estimation of precision becomes less precise at high slope values.

A4.8.2 Calculate the slope or rate of change in temperature reading,  $S_C$  (or  $S_F$ ), as described in 13.2 and Eq 11 and using temperature values bracketing the desired temperature.

A4.8.3 Calculate the repeatability,  $r$ , or the reproducibility,  $R$ , from the slope,  $S_C$  (or  $S_F$ ), and the data in Table 8, Table 9, or Table 10.

A4.8.4 Determine the repeatability or reproducibility, or both, of the volume % evaporated or recovered at a prescribed temperature from the following formulas:

$$r_{\text{volume \%}} = r/S_C (S_F) \quad (\text{A4.1})$$

$$R_{\text{volume \%}} = R/S_C (S_F) \quad (\text{A4.2})$$

where:

$r_{\text{volume \%}}$  = repeatability of the volume % evaporated or recovered,

$R_{\text{volume \%}}$  = reproducibility of the volume % evaporated or recovered,

$r$  = repeatability of the temperature at the prescribed temperature at the observed percent distilled,

$R$  = reproducibility of the temperature at the prescribed temperature at the observed percent distilled, and

$S_C (S_F)$  = rate of change in temperature reading in  $^{\circ}\text{C}$  ( $^{\circ}\text{F}$ ) per the volume % evaporated or recovered.

A4.8.5 Examples on how to calculate the repeatability and the reproducibility are shown in Appendix X2.

## APPENDIXES

### (Nonmandatory Information)

#### X1. EXAMPLES ILLUSTRATING CALCULATIONS FOR REPORTING OF DATA

X1.1 The observed distillation data used for the calculation of the examples below are shown in the first three columns of Fig. X1.1.

X1.1.1 Temperature readings corrected to 101.3 kPa (760 mm Hg) pressure (see 11.3) are as follows:

$$\text{correction } (^{\circ}\text{C}) = 0.0009 (101.3 - 98.6) (273 + t_c) \quad (\text{X1.1})$$

$$\text{correction } (^{\circ}\text{F}) = 0.00012 (760 - 740) (460 + t_f) \quad (\text{X1.2})$$

X1.1.2 Loss correction to 101.3 kPa (see 11.4) are as follows. The data for the examples are taken from Fig. X1.1.

$$\text{corrected loss} = (0.5 + (4.7 - 0.5)/\{1 + (101.3 - 98.6)/8.0\}) = 3.6 \quad (\text{X1.3})$$

X1.1.3 Recovery correction to 101.3 kPa (see 11.4.1) are as follows:

$$\text{corrected recovery} = 94.2 + (4.7 - 3.6) = 95.3 \quad (\text{X1.4})$$

X1.2 *Temperature Readings at Prescribed Percent Evaporated:*

X1.2.1 Temperature reading at 10 % evaporated (4.7 % observed loss = 5.3 % recovered) (see 11.6.1) are as follows:

$$T_{10E} (^{\circ}\text{C}) = 33.7 + [(40.3 - 33.7) \quad (\text{X1.5})$$

$$(5.3 - 5)/(10 - 5)] = 34.1^{\circ}\text{C}$$

$$T_{10E} (^{\circ}\text{F}) = 92.7 + [(104.5 - 92.7) \quad (\text{X1.6})$$

$$(5.3 - 5)/(10 - 5)] = 93.1^{\circ}\text{F}$$

X1.2.2 Temperature reading at 50 % evaporated (45.3 % recovered) (see 11.6.1) are as follows:

$$T_{50E} (^{\circ}\text{C}) = 93.9 + [(108.9 - 93.9) \quad (\text{X1.7})$$

$$(45.3 - 40)/(50 - 40)] = 101.9^{\circ}\text{C}$$


$$T_{50E} (^{\circ}\text{F}) = 201 + [(228 - 201) \quad (\text{X1.8})$$

$$(45.3 - 40)/(50 - 40)] = 215.3^{\circ}\text{F}$$

X1.2.3 Temperature reading at 90 % evaporated (85.3 % recovered) (see 11.6.1) are as follows:

$$T_{90E} (^{\circ}\text{C}) = 181.6 + [(201.6 - 181.6) \quad (\text{X1.9})$$

$$(85.3 - 85)/(90 - 85)] = 182.8^{\circ}\text{C}$$

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$$T_{90E} (^{\circ}F) = 358.9 + [(394.8 - 358.9) \cdot (85.3 - 85) / (90 - 85)] = 361.0^{\circ}F \quad (X1.10)$$

X1.2.4 Temperature reading at 90 % evaporated (85.3 % recovered) not corrected to 101.3 kPa pressure (see 11.6.1) are as follows:

$$T_{90E} (^{\circ}C) = 180.5 + [(200.4 - 180.5) \cdot (85.3 - 85) / (90 - 85)] = 181.7^{\circ}C \quad (X1.11)$$

$$T_{90E} (^{\circ}F) = 357 + [(392 - 357) \cdot (85.3 - 85) / (90 - 85)] = 359.1^{\circ}F \quad (X1.12)$$

NOTE X1.1—Results calculated from  $^{\circ}C$  data may not correspond exactly to results calculated from  $^{\circ}F$  data because of errors in rounding.

Sample ID:  
 Date analyzed:  
 Equipment No:  
 Remarks:  
 Barometric pressure: 98.6 kPa  
 Analyst:

| % recovered  | Barometric pressure               |                                     |       |       | % evaporated | procedure        |                 |
|--------------|-----------------------------------|-------------------------------------|-------|-------|--------------|------------------|-----------------|
|              | observed<br>98.6 kPa<br>740 mm Hg | corrected<br>101.3 kPa<br>760 mm Hg | °C    | °F    |              | arithmetic<br>°C | graphical<br>°F |
| IAP          | 25.5                              | 78                                  | 26.2  | 79.2  | 5            | 26.7             | 80.0            |
| 5            | 33.0                              | 91                                  | 33.7  | 92.7  | 10           | 34.1             | 93.4            |
| 10           | 39.5                              | 103                                 | 40.3  | 104.5 | 15           | 40.7             | 105.2           |
| 15           | 46.0                              | 115                                 | 46.8  | 116.2 | 20           | 47.3             | 117.1           |
| 20           | 54.5                              | 130                                 | 55.3  | 131.5 | 30           | 65.7             | 150.2           |
| 30           | 74.0                              | 165                                 | 74.8  | 166.7 | 40           | 84.9             | 184.9           |
| 40           | 93.0                              | 199                                 | 93.9  | 201.0 | 50           | 101.9            | 215.3           |
| 50           | 108.0                             | 226                                 | 108.9 | 228.0 | 60           | 116.9            | 242.4           |
| 60           | 123.0                             | 253                                 | 124.0 | 255.1 | 70           | 134.1            | 273.3           |
| 70           | 142.0                             | 288                                 | 143.0 | 289.4 | 80           | 156.0            | 312.8           |
| 80           | 166.5                             | 332                                 | 167.6 | 333.6 | 85           | 168.4            | 335.1           |
| 85           | 180.5                             | 357                                 | 181.6 | 358.9 | 90           | 182.8            | 361.0           |
| 90           | 200.4                             | 393                                 | 201.6 | 394.8 | 95           | 202.4            | 396.3           |
| EP           | 215.0                             | 419                                 | 216.2 | 421.1 |              |                  |                 |
| recovered, % | 94.2                              |                                     | 95.3  |       |              |                  |                 |
| residue, %   | 1.1                               |                                     | 1.1   |       |              |                  |                 |
| loss, %      | 4.7                               |                                     | 3.6   |       |              |                  |                 |

FIG. X1.1 Example of Test Report

## X2. EXAMPLES OF CALCULATION OF REPEATABILITY AND REPRODUCIBILITY OF VOLUME % (RECOVERED OR EVAPORATED) AT A PRESCRIBED TEMPERATURE READING

X2.1 Some specifications require the reporting of the volume % evaporated or recovered at a prescribed temperature. Table X2.1 shows the distillation data of a Group 1 sample as obtained by an automated unit.

### X2.2 Example Calculation:

X2.2.1 For a Group 1 sample exhibiting distillation characteristics as per Table X2.1, as determined by an automated unit, the reproducibility of the volume evaporated,  $R$ , volume %, at 93.3°C (200°F) is determined as follows:

X2.2.1.1 Determine first the slope at the desired temperature:

$$\begin{aligned} S_C \% &= 0.1 (T_{(20)} - T_{(10)}) & (X2.1) \\ &= 0.1 (94 - 83) \\ &= 1.1 \\ S_F \% &= 0.1 (T_{(20)} - T_{(10)}) \\ &= 0.1 (201 - 182) \\ &= 1.9 \end{aligned}$$

X2.2.2 From Table 9, determine the value of  $R$ , the reproducibility at the observed percentage distilled. In this case, the observed percentage distilled is 18 % and

$$\begin{aligned} R &= 3.3 + 2.0 (S_C) & (X2.2) \\ &= 3.3 + 2.0 \times 1.1 \\ &= 5.5 \\ R &= 6.0 + 2.0 (S_F) \\ &= 6.0 + 2.0 \times 1.9 \end{aligned}$$

$$= 9.8$$

X2.2.3 From the calculated value of  $R$ , determine the value of volume, as described in A4.8.4.

$$\begin{aligned} R \text{ volume \%} &= R/(S_C) & (X2.3) \\ &= 5.5/1.1 \\ &= 5.0 \\ R \text{ volume \%} &= R/(S_F) \\ &= 9.8/1.9 \\ &= 5.1 \end{aligned}$$

**TABLE X2.1 Distillation Data from a Group 1 Sample Automated Distillation**

| Distillation Point Recovered, mL | Temperature° C | Temperature °F | Volume (mL) Recovered at 93.3°C (200°F) |
|----------------------------------|----------------|----------------|---|
|                                  |                |                | 18.0                                    |
| 10                               | 84             | 183            |   |
| 20                               | 94             | 202            |   |
| 30                               | 103            | 217            |   |
| 40                               | 112            | 233            |   |

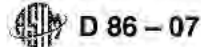
  

| Distillation Point Evaporated, mL | Temperature° C | Temperature° F | Volume (mL) Evaporated at 93.3°C (200°F) |
|-----------------------------------|----------------|----------------|--|
|                                   |                |                | 18.4                                     |
| 10                                | 83             | 182            |  |
| 20                                | 94             | 201            |  |
| 30                                | 103            | 217            |  |
| 40                                | 111            | 232            |  |

## X3. TABLES OF CORRECTED LOSS FROM MEASURED LOSS AND BAROMETRIC PRESSURE

X3.1 The table presented as Fig. X3.1 can be used to determine the corrected loss from the measured loss and the barometric pressure in kPa.

X3.2 The table presented as Fig. X3.2 can be used to determine the corrected loss from the measured loss and the barometric pressure in mm Hg.



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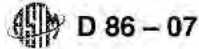
Barometric Pressure, kPa:

|               | from    | 76.1                      | 80.9 | 84.5 | 87.3 | 89.6 | 91.5  | 93.1  | 94.1  | 95.5  | 96.4  | 97.2  | 97.9  | 98.4  | 98.9  | 99.5  | 100.0 | 100.4 | 100.8 | 101.2 | 101.5 | 102.0 | 102.4 | 102.8 | 103.2 |  |  |
|---------------|---------|---------------------------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|
|               | through | 80.8                      | 84.4 | 87.2 | 89.5 | 91.4 | 93.0  | 94.0  | 95.4  | 96.3  | 97.1  | 97.8  | 98.3  | 98.8  | 99.4  | 99.9  | 100.3 | 100.7 | 101.1 | 101.4 | 101.9 | 102.3 | 102.7 | 103.1 | 103.5 |  |  |
| Observed Loss |         |                           |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |  |  |
|               |         | --- Corrected Loss -----> |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |  |  |
| Units         |         |                           |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |  |  |
| 0             | 0.37    | 0.35                      | 0.33 | 0.31 | 0.29 | 0.27 | 0.25  | 0.23  | 0.20  | 0.18  | 0.16  | 0.14  | 0.13  | 0.11  | 0.09  | 0.06  | 0.04  | 0.02  | -0.00 | -0.02 | -0.06 | -0.09 | -0.13 | -0.17 |       |  |  |
| 1             | 0.63    | 0.65                      | 0.67 | 0.69 | 0.71 | 0.73 | 0.75  | 0.78  | 0.80  | 0.82  | 0.84  | 0.86  | 0.87  | 0.89  | 0.92  | 0.94  | 0.96  | 0.98  | 1.00  | 1.03  | 1.06  | 1.09  | 1.13  | 1.17  |       |  |  |
| 2             | 0.89    | 0.95                      | 1.01 | 1.08 | 1.14 | 1.20 | 1.26  | 1.33  | 1.40  | 1.46  | 1.52  | 1.57  | 1.62  | 1.68  | 1.75  | 1.81  | 1.87  | 1.94  | 2.00  | 2.06  | 2.17  | 2.27  | 2.38  | 2.51  |       |  |  |
| 3             | 1.15    | 1.25                      | 1.36 | 1.46 | 1.57 | 1.67 | 1.77  | 1.88  | 1.99  | 2.09  | 2.19  | 2.28  | 2.37  | 2.47  | 2.56  | 2.69  | 2.79  | 2.90  | 3.00  | 3.13  | 3.29  | 3.45  | 3.63  | 3.84  |       |  |  |
| 4             | 1.41    | 1.56                      | 1.70 | 1.84 | 1.99 | 2.14 | 2.28  | 2.43  | 2.59  | 2.73  | 2.87  | 3.00  | 3.12  | 3.26  | 3.41  | 3.56  | 3.70  | 3.85  | 4.00  | 4.18  | 4.40  | 4.63  | 4.89  | 5.16  |       |  |  |
| 5             | 1.68    | 1.86                      | 2.04 | 2.23 | 2.42 | 2.61 | 2.79  | 2.98  | 3.19  | 3.37  | 3.55  | 3.71  | 3.87  | 4.05  | 4.25  | 4.44  | 4.62  | 4.81  | 5.00  | 5.23  | 5.51  | 5.81  | 6.14  | 6.52  |       |  |  |
| 6             | 1.94    | 2.16                      | 2.39 | 2.61 | 2.84 | 3.08 | 3.30  | 3.53  | 3.78  | 4.01  | 4.23  | 4.42  | 4.62  | 4.84  | 5.08  | 5.31  | 5.53  | 5.77  | 6.00  | 6.28  | 6.63  | 6.99  | 7.40  | 7.86  |       |  |  |
| 7             | 2.20    | 2.46                      | 2.73 | 3.00 | 3.27 | 3.55 | 3.80  | 4.08  | 4.38  | 4.65  | 4.90  | 5.14  | 5.37  | 5.63  | 5.91  | 6.18  | 6.44  | 6.73  | 7.00  | 7.33  | 7.74  | 8.17  | 8.65  | 9.20  |       |  |  |
| 8             | 2.46    | 2.76                      | 3.07 | 3.38 | 3.70 | 4.02 | 4.31  | 4.63  | 4.98  | 5.28  | 5.58  | 5.85  | 6.12  | 6.41  | 6.74  | 7.06  | 7.36  | 7.69  | 8.00  | 8.38  | 8.86  | 9.35  | 9.90  | 10.53 |       |  |  |
| 9             | 2.72    | 3.07                      | 3.41 | 3.76 | 4.12 | 4.49 | 4.82  | 5.18  | 5.57  | 5.92  | 6.26  | 6.56  | 6.87  | 7.20  | 7.57  | 7.93  | 8.27  | 8.65  | 9.00  | 9.43  | 9.97  | 10.53 | 11.16 | 11.87 |       |  |  |
| 10            | 2.98    | 3.37                      | 3.76 | 4.15 | 4.55 | 4.96 | 5.33  | 5.73  | 6.17  | 6.56  | 6.94  | 7.28  | 7.62  | 7.99  | 8.41  | 8.81  | 9.19  | 9.60  | 10.00 | 10.48 | 11.08 | 11.71 | 12.41 | 13.21 |       |  |  |
| 11            | 3.24    | 3.67                      | 4.10 | 4.53 | 4.97 | 5.43 | 5.84  | 6.28  | 6.77  | 7.20  | 7.61  | 7.99  | 8.37  | 8.78  | 9.24  | 9.68  | 10.10 | 10.56 | 11.00 | 11.53 | 12.20 | 12.89 | 13.67 | 14.55 |       |  |  |
| 12            | 3.50    | 3.97                      | 4.44 | 4.92 | 5.40 | 5.90 | 6.35  | 6.83  | 7.36  | 7.84  | 8.29  | 8.71  | 9.12  | 9.57  | 10.07 | 10.56 | 11.02 | 11.52 | 12.00 | 12.59 | 13.31 | 14.07 | 14.92 | 15.89 |       |  |  |
| 13            | 3.76    | 4.27                      | 4.78 | 5.30 | 5.83 | 6.36 | 6.86  | 7.39  | 7.96  | 8.47  | 8.97  | 9.42  | 9.86  | 10.30 | 10.80 | 11.43 | 11.93 | 12.48 | 13.00 | 13.64 | 14.43 | 15.25 | 16.17 | 17.22 |       |  |  |
| 14            | 4.03    | 4.58                      | 5.13 | 5.69 | 6.25 | 6.83 | 7.36  | 7.94  | 8.56  | 9.11  | 9.64  | 10.13 | 10.61 | 11.15 | 11.74 | 12.31 | 12.85 | 13.44 | 14.00 | 14.69 | 15.54 | 16.43 | 17.43 | 18.56 |       |  |  |
| 15            | 4.29    | 4.88                      | 5.47 | 6.07 | 6.68 | 7.30 | 7.87  | 8.49  | 9.15  | 9.75  | 10.32 | 10.85 | 11.36 | 11.93 | 12.57 | 13.18 | 13.76 | 14.40 | 15.00 | 15.74 | 16.68 | 17.81 | 18.98 | 19.90 |       |  |  |
| 16            | 4.55    | 5.18                      | 5.81 | 6.45 | 7.10 | 7.77 | 8.38  | 9.04  | 9.75  | 10.39 | 11.00 | 11.56 | 12.11 | 12.72 | 13.40 | 14.06 | 14.68 | 15.38 | 16.00 | 16.79 | 17.77 | 18.79 | 19.94 | 21.24 |       |  |  |
| 17            | 4.81    | 5.48                      | 6.16 | 6.84 | 7.53 | 8.24 | 8.89  | 9.59  | 10.35 | 11.03 | 11.68 | 12.27 | 12.86 | 13.51 | 14.23 | 14.93 | 15.59 | 16.31 | 17.00 | 17.84 | 18.88 | 19.97 | 21.19 | 22.58 |       |  |  |
| 18            | 5.07    | 5.78                      | 6.50 | 7.22 | 7.96 | 8.71 | 9.40  | 10.14 | 10.94 | 11.66 | 12.35 | 12.99 | 13.61 | 14.30 | 15.07 | 15.80 | 16.50 | 17.27 | 18.00 | 18.89 | 20.00 | 21.15 | 22.44 | 23.91 |       |  |  |
| 19            | 5.33    | 6.08                      | 6.84 | 7.61 | 8.38 | 9.18 | 9.91  | 10.69 | 11.54 | 12.30 | 13.03 | 13.70 | 14.31 | 15.09 | 15.90 | 16.68 | 17.42 | 18.23 | 19.00 | 19.94 | 21.11 | 22.33 | 23.70 | 25.25 |       |  |  |
| 20            | 5.59    | 6.39                      | 7.18 | 7.99 | 8.81 | 9.65 | 10.41 | 11.24 | 12.14 | 12.94 | 13.71 | 14.41 | 15.11 | 15.88 | 16.73 | 17.55 | 18.33 | 19.19 | 20.00 | 20.99 | 22.23 | 23.51 | 24.95 | 26.59 |       |  |  |
| Tenths        |         |                           |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |  |  |
| 0.0           | 0.00    | 0.00                      | 0.00 | 0.00 | 0.00 | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |       |  |  |
| 0.1           | 0.03    | 0.03                      | 0.03 | 0.04 | 0.04 | 0.05 | 0.05  | 0.06  | 0.06  | 0.06  | 0.07  | 0.07  | 0.07  | 0.08  | 0.08  | 0.09  | 0.09  | 0.10  | 0.10  | 0.11  | 0.11  | 0.12  | 0.13  | 0.15  |       |  |  |
| 0.2           | 0.05    | 0.06                      | 0.07 | 0.08 | 0.09 | 0.09 | 0.10  | 0.11  | 0.12  | 0.13  | 0.14  | 0.14  | 0.15  | 0.16  | 0.17  | 0.17  | 0.18  | 0.19  | 0.20  | 0.21  | 0.22  | 0.24  | 0.25  | 0.27  |       |  |  |
| 0.3           | 0.08    | 0.09                      | 0.10 | 0.12 | 0.13 | 0.14 | 0.15  | 0.17  | 0.18  | 0.19  | 0.20  | 0.21  | 0.22  | 0.24  | 0.25  | 0.26  | 0.27  | 0.29  | 0.30  | 0.32  | 0.33  | 0.35  | 0.38  | 0.40  |       |  |  |
| 0.4           | 0.10    | 0.12                      | 0.14 | 0.15 | 0.17 | 0.19 | 0.20  | 0.22  | 0.24  | 0.26  | 0.27  | 0.29  | 0.30  | 0.32  | 0.33  | 0.35  | 0.37  | 0.38  | 0.40  | 0.42  | 0.45  | 0.47  | 0.50  | 0.54  |       |  |  |
| 0.5           | 0.13    | 0.15                      | 0.17 | 0.19 | 0.21 | 0.23 | 0.25  | 0.28  | 0.30  | 0.32  | 0.34  | 0.36  | 0.37  | 0.39  | 0.42  | 0.44  | 0.46  | 0.48  | 0.50  | 0.53  | 0.56  | 0.59  | 0.63  | 0.67  |       |  |  |
| 0.6           | 0.16    | 0.18                      | 0.21 | 0.23 | 0.26 | 0.28 | 0.31  | 0.33  | 0.36  | 0.38  | 0.41  | 0.43  | 0.45  | 0.47  | 0.50  | 0.52  | 0.55  | 0.58  | 0.60  | 0.63  | 0.67  | 0.71  | 0.75  | 0.80  |       |  |  |
| 0.7           | 0.18    | 0.21                      | 0.24 | 0.27 | 0.30 | 0.33 | 0.36  | 0.39  | 0.42  | 0.45  | 0.47  | 0.50  | 0.52  | 0.55  | 0.58  | 0.61  | 0.64  | 0.67  | 0.70  | 0.74  | 0.78  | 0.83  | 0.88  | 0.94  |       |  |  |
| 0.8           | 0.21    | 0.24                      | 0.27 | 0.31 | 0.34 | 0.38 | 0.41  | 0.44  | 0.48  | 0.51  | 0.54  | 0.57  | 0.60  | 0.63  | 0.67  | 0.70  | 0.73  | 0.77  | 0.80  | 0.84  | 0.89  | 0.94  | 1.00  | 1.07  |       |  |  |
| 0.9           | 0.24    | 0.27                      | 0.31 | 0.35 | 0.38 | 0.42 | 0.46  | 0.50  | 0.54  | 0.57  | 0.61  | 0.64  | 0.67  | 0.71  | 0.75  | 0.79  | 0.82  | 0.86  | 0.90  | 0.95  | 1.00  | 1.06  | 1.13  | 1.20  |       |  |  |

FIG. X3.1 Corrected Loss from Observed Loss and Barometric Pressure kPa

Barometric Pressure, mm Hg:

|                | from    | 571  | 607  | 634  | 655  | 671  | 686   | 698   | 706   | 716   | 723   | 729   | 734   | 738   | 742   | 746   | 750   | 753   | 756   | 759   | 762   | 765   | 768   | 771   | 774  |
|----------------|---------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                | through | 606  | 633  | 654  | 671  | 685  | 697   | 705   | 715   | 722   | 728   | 733   | 737   | 741   | 745   | 749   | 752   | 755   | 758   | 761   | 764   | 767   | 770   | 773   | 776  |
| Observed Loss  |         |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |
| Corrected Loss |         |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |
| Units          |         |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |
| 0              | 0.37    | 0.35 | 0.33 | 0.31 | 0.29 | 0.27 | 0.25  | 0.23  | 0.20  | 0.18  | 0.16  | 0.14  | 0.13  | 0.11  | 0.09  | 0.07  | 0.05  | 0.02  | -0.00 | -0.03 | -0.06 | -0.09 | -0.13 | -0.17 |      |
| 1              | 0.63    | 0.65 | 0.67 | 0.69 | 0.71 | 0.73 | 0.75  | 0.77  | 0.80  | 0.82  | 0.84  | 0.86  | 0.87  | 0.89  | 0.91  | 0.93  | 0.95  | 0.98  | 1.00  | 1.03  | 1.06  | 1.09  | 1.13  | 1.17  |      |
| 2              | 0.89    | 0.95 | 1.01 | 1.07 | 1.14 | 1.20 | 1.26  | 1.32  | 1.39  | 1.45  | 1.51  | 1.57  | 1.62  | 1.68  | 1.74  | 1.80  | 1.86  | 1.93  | 2.00  | 2.08  | 2.17  | 2.27  | 2.36  | 2.50  |      |
| 3              | 1.15    | 1.25 | 1.36 | 1.46 | 1.56 | 1.67 | 1.77  | 1.87  | 1.99  | 2.09  | 2.19  | 2.28  | 2.36  | 2.46  | 2.57  | 2.67  | 2.77  | 2.88  | 3.00  | 3.13  | 3.28  | 3.44  | 3.63  | 3.83  |      |
| 4              | 1.41    | 1.55 | 1.70 | 1.84 | 1.99 | 2.14 | 2.27  | 2.42  | 2.58  | 2.72  | 2.86  | 2.99  | 3.11  | 3.25  | 3.40  | 3.54  | 3.68  | 3.83  | 4.00  | 4.19  | 4.39  | 4.62  | 4.88  | 5.17  |      |
| 5              | 1.67    | 1.86 | 2.04 | 2.22 | 2.41 | 2.61 | 2.78  | 2.97  | 3.18  | 3.36  | 3.54  | 3.70  | 3.86  | 4.03  | 4.23  | 4.41  | 4.59  | 4.79  | 5.00  | 5.24  | 5.50  | 5.80  | 6.13  | 6.50  |      |
| 6              | 1.93    | 2.16 | 2.38 | 2.61 | 2.84 | 3.07 | 3.29  | 3.52  | 3.77  | 3.99  | 4.21  | 4.41  | 4.60  | 4.82  | 5.05  | 5.28  | 5.50  | 5.74  | 6.00  | 6.29  | 6.61  | 6.97  | 7.38  | 7.84  |      |
| 7              | 2.19    | 2.46 | 2.72 | 2.99 | 3.26 | 3.54 | 3.79  | 4.07  | 4.36  | 4.63  | 4.88  | 5.12  | 5.35  | 5.60  | 5.88  | 6.15  | 6.41  | 6.69  | 7.00  | 7.34  | 7.72  | 8.15  | 8.63  | 9.17  |      |
| 8              | 2.46    | 2.76 | 3.07 | 3.37 | 3.69 | 4.01 | 4.30  | 4.62  | 4.96  | 5.27  | 5.56  | 5.83  | 6.09  | 6.38  | 6.71  | 7.02  | 7.32  | 7.64  | 8.00  | 8.40  | 8.84  | 9.33  | 9.88  | 10.50 |      |
| 9              | 2.72    | 3.06 | 3.41 | 3.76 | 4.11 | 4.48 | 4.81  | 5.17  | 5.55  | 5.90  | 6.23  | 6.54  | 6.84  | 7.17  | 7.54  | 7.89  | 8.23  | 8.60  | 9.00  | 9.45  | 9.95  | 10.50 | 11.13 | 11.84 |      |
| 10             | 2.98    | 3.36 | 3.75 | 4.14 | 4.54 | 4.94 | 5.31  | 5.71  | 6.15  | 6.54  | 6.91  | 7.25  | 7.58  | 7.95  | 8.37  | 8.76  | 9.14  | 9.55  | 10.00 | 10.50 | 11.06 | 11.68 | 12.38 | 13.17 |      |
| 11             | 3.24    | 3.66 | 4.09 | 4.52 | 4.96 | 5.41 | 5.82  | 6.26  | 6.74  | 7.17  | 7.58  | 7.96  | 8.33  | 8.74  | 9.19  | 9.63  | 10.05 | 10.50 | 11.00 | 11.56 | 12.17 | 12.86 | 13.63 | 14.51 |      |
| 12             | 3.50    | 3.96 | 4.43 | 4.91 | 5.39 | 5.88 | 6.33  | 6.81  | 7.34  | 7.81  | 8.26  | 8.67  | 9.07  | 9.52  | 10.02 | 10.50 | 10.96 | 11.46 | 12.00 | 12.61 | 13.28 | 14.03 | 14.88 | 15.84 |      |
| 13             | 3.76    | 4.27 | 4.78 | 5.29 | 5.81 | 6.35 | 6.83  | 7.36  | 7.93  | 8.44  | 8.93  | 9.38  | 9.82  | 10.31 | 10.85 | 11.37 | 11.87 | 12.41 | 13.00 | 13.66 | 14.39 | 15.21 | 16.13 | 17.17 |      |
| 14             | 4.02    | 4.57 | 5.12 | 5.67 | 6.24 | 6.82 | 7.34  | 7.91  | 8.53  | 9.08  | 9.61  | 10.09 | 10.57 | 11.09 | 11.68 | 12.24 | 12.78 | 13.36 | 14.00 | 14.71 | 15.51 | 16.39 | 17.38 | 18.51 |      |
| 15             | 4.28    | 4.87 | 5.46 | 6.06 | 6.66 | 7.28 | 7.85  | 8.46  | 9.12  | 9.71  | 10.28 | 10.80 | 11.31 | 11.88 | 12.51 | 13.11 | 13.68 | 14.31 | 15.00 | 15.77 | 16.62 | 17.57 | 18.63 | 19.84 |      |
| 16             | 4.54    | 5.17 | 5.80 | 6.44 | 7.09 | 7.75 | 8.35  | 9.01  | 9.72  | 10.35 | 10.95 | 11.51 | 12.06 | 12.66 | 13.33 | 13.98 | 14.59 | 15.27 | 16.00 | 16.82 | 17.73 | 18.74 | 19.88 | 21.18 |      |
| 17             | 4.80    | 5.47 | 6.14 | 6.82 | 7.51 | 8.22 | 8.86  | 9.56  | 10.31 | 10.98 | 11.63 | 12.22 | 12.80 | 13.45 | 14.16 | 14.85 | 15.50 | 16.22 | 17.00 | 17.87 | 18.84 | 19.92 | 21.13 | 22.51 |      |
| 18             | 5.06    | 5.77 | 6.49 | 7.21 | 7.94 | 8.69 | 9.37  | 10.11 | 10.91 | 11.62 | 12.30 | 13.03 | 13.55 | 14.23 | 14.99 | 15.72 | 16.41 | 17.17 | 18.01 | 18.98 | 19.95 | 21.10 | 22.38 | 23.84 |      |
| 19             | 5.32    | 6.07 | 6.83 | 7.59 | 8.36 | 9.15 | 9.88  | 10.65 | 11.50 | 12.25 | 12.98 | 13.68 | 14.29 | 15.02 | 15.82 | 16.57 | 17.32 | 18.12 | 19.01 | 19.98 | 21.06 | 22.27 | 23.64 | 25.18 |      |
| 20             | 5.58    | 6.37 | 7.17 | 7.97 | 8.79 | 9.62 | 10.38 | 11.20 | 12.09 | 12.89 | 13.65 | 14.35 | 15.04 | 15.80 | 16.64 | 17.46 | 18.25 | 19.08 | 20.01 | 21.03 | 22.17 | 23.45 | 24.89 | 26.51 |      |
| Tenths         |         |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |
| 0.0            | 0.00    | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |      |
| 0.1            | 0.03    | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.05  | 0.05  | 0.06  | 0.06  | 0.07  | 0.07  | 0.07  | 0.08  | 0.08  | 0.08  | 0.09  | 0.09  | 0.10  | 0.10  | 0.11  | 0.11  | 0.12  | 0.13  | 0.13 |
| 0.2            | 0.05    | 0.06 | 0.07 | 0.08 | 0.08 | 0.09 | 0.10  | 0.11  | 0.12  | 0.13  | 0.13  | 0.14  | 0.15  | 0.16  | 0.17  | 0.17  | 0.18  | 0.19  | 0.20  | 0.21  | 0.22  | 0.24  | 0.25  | 0.27  |      |
| 0.3            | 0.08    | 0.09 | 0.10 | 0.11 | 0.13 | 0.14 | 0.15  | 0.16  | 0.18  | 0.19  | 0.20  | 0.21  | 0.22  | 0.24  | 0.25  | 0.26  | 0.27  | 0.29  | 0.30  | 0.32  | 0.33  | 0.35  | 0.38  | 0.40  |      |
| 0.4            | 0.10    | 0.12 | 0.14 | 0.15 | 0.17 | 0.19 | 0.20  | 0.22  | 0.24  | 0.25  | 0.27  | 0.28  | 0.30  | 0.31  | 0.33  | 0.35  | 0.36  | 0.38  | 0.40  | 0.42  | 0.44  | 0.47  | 0.50  | 0.53  |      |
| 0.5            | 0.13    | 0.15 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25  | 0.27  | 0.30  | 0.32  | 0.34  | 0.36  | 0.37  | 0.39  | 0.41  | 0.43  | 0.45  | 0.46  | 0.50  | 0.53  | 0.56  | 0.59  | 0.63  | 0.67  |      |
| 0.6            | 0.16    | 0.18 | 0.21 | 0.23 | 0.25 | 0.28 | 0.30  | 0.33  | 0.36  | 0.38  | 0.40  | 0.43  | 0.45  | 0.47  | 0.50  | 0.52  | 0.55  | 0.57  | 0.60  | 0.63  | 0.67  | 0.71  | 0.75  | 0.80  |      |
| 0.7            | 0.18    | 0.21 | 0.24 | 0.27 | 0.30 | 0.33 | 0.35  | 0.38  | 0.42  | 0.44  | 0.47  | 0.50  | 0.52  | 0.55  | 0.58  | 0.61  | 0.64  | 0.67  | 0.70  | 0.74  | 0.78  | 0.82  | 0.86  | 0.93  |      |
| 0.8            | 0.21    | 0.24 | 0.27 | 0.31 | 0.34 | 0.37 | 0.41  | 0.44  | 0.48  | 0.51  | 0.54  | 0.57  | 0.60  | 0.63  | 0.66  | 0.70  | 0.73  | 0.76  | 0.80  | 0.84  | 0.89  | 0.94  | 1.00  | 1.07  |      |
| 0.9            | 0.23    | 0.27 | 0.31 | 0.34 | 0.38 | 0.42 | 0.46  | 0.49  | 0.54  | 0.57  | 0.61  | 0.64  | 0.67  | 0.71  | 0.75  | 0.78  | 0.82  | 0.86  | 0.90  | 0.95  | 1.00  | 1.06  | 1.13  | 1.22  |      |



#### X4. PROCEDURE TO EMULATE THE EMERGENT STEM ERROR OF A MERCURY-IN-GLASS THERMOMETER

X4.1 When an electronic or other sensor without an emergent stem error is used, the output of this sensor or the associated data system should emulate the output of a mercury-in-glass thermometer. Based on information supplied by four manufacturers of automated Test Method D 86 equipment, the averaged equations shown in X4.2 and X4.3 have been reported to be in use.

X4.1.1 The equations shown in X4.2 have limited applicability and are shown for information purposes only. In addition to the correction for the emergent stem, the electronic sensor and associated data system will also have to emulate the lag in response time observed for mercury-in-glass thermometers.

X4.2 When a low range thermometer would have been used, no stem correction is to be applied below 20°C. Above this temperature, the correction is calculated using the following formula:

$$ASTM\ 7C\ T_{elr} = T_t - 0.000162 \times (T_t - 20^\circ C)^2 \quad (X4.1)$$

X4.3 When a high range thermometer would have been used, no stem correction is to be applied below 35°C. Above this temperature the correction is calculated using the following formula:

$$ASTM\ 8C\ T_{ehr} = T_t - 0.000131 \times (T_t - 35^\circ C)^2 \quad (X4.2)$$

where:

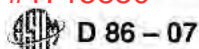
$T_{elr}$  = emulated temperature in °C for low range thermometers,

$T_{ehr}$  = emulated temperature in °C for high range thermometers, and

$T_t$  = true temperature in °C.

#### X5. EXPLANATORY REPORT FORMS

X5.1 Fig. X5.1 and Fig. X5.2 show report forms.



# "Percent Recovered" Report Form

Date:   
 Time:   
 Operator:

Ambient temperature (°C)   
 Atmospheric pressure (kPa)   
 Condenser temperature (°C)   
 Temperature of the bath around receiving cylinder (°C)

| Percent Recovered | Corrected Temperature Reading (°C) | Time or mL / min |
|-------------------|------------------------------------|------------------|
| IBP               |                                    |                  |
| 5                 |                                    |                  |
| 10                |                                    |                  |
| 15                |                                    |                  |
| 20                |                                    |                  |
| 25                |                                    |                  |
| 30                |                                    |                  |
| 35                |                                    |                  |
| 40                |                                    |                  |
| 45                |                                    |                  |
| 50                |                                    |                  |
| 55                |                                    |                  |
| 60                |                                    |                  |
| 65                |                                    |                  |
| 70                |                                    |                  |
| 75                |                                    |                  |
| 80                |                                    |                  |
| 85                |                                    |                  |
| 90                |                                    |                  |
| 5 ml residue      |                                    |                  |
| 95                |                                    |                  |
| FBP               |                                    |                  |

Percent Recovery   
 Percent Residue   
 Percent Total Recovery   
 Percent Loss   
 Corrected Percent Recovery  Corrected Total Recovery

Comments:

Ambient temperature at the start of the test

Ambient barometric pressure at the start of the test

Volume of condensate observed in the receiving cylinder at any point in the distillation, expressed as a percentage of the charge volume, in connection with simultaneous temperature reading

Temperature measuring device readings which are corrected to 101.3 kPa barometric pressure

Group 1, 2 & 3: 5 to 10 minutes  
 Group 4: 5 to 15 minutes

Group 1 & 2: 50 to 100 seconds

4 to 5 ml / min uniform average rate from 5% recovered to 5 ml in flask

Volume of condensate observed in the receiving cylinder when the 5ml conditions are reached

Volume of condensate observed in the receiving cylinder when the final boiling point is observed

Maximum percent recovered

Volume of residue in the flask expressed as a percentage of the charge volume

Combined Percent Recovery and Percent Residue in the flask

Time from 5 ml in flask to FBP = < 5 minutes

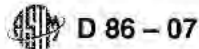
100 minus the Total Recovery

Percent Recovery corrected for barometric pressure

Percent Loss corrected for barometric pressure

Combined Percent Recovery and Percent Residue in the flask corrected for barometric pressure

FIG. X5.1 Percent Recovered Report Form



# "Percent Evaporated" Report Form

Laboratory:

Date:   
 Time:   
 Operator:

Ambient temperature (°C)   
 Atmospheric pressure (kPa)   
 Condenser temperature (°C)   
 Temperature of the bath around receiving cylinder (°C)

| Percent Recovered | Corrected Temperature Reading (°C) | Time or mL / min | Percent Evaporated | Temperature Readings at prescribed percent evaporated (°C) |
|-------------------|------------------------------------|------------------|--------------------|--|
| IBP               |                                    |                  | IBP                |  |
| 5                 |                                    |                  | 5                  |  |
| 10                |                                    |                  | 10                 |  |
| 15                |                                    |                  | 15                 |  |
| 20                |                                    |                  | 20                 |  |
| 25                |                                    |                  | 25                 |  |
| 30                |                                    |                  | 30                 |  |
| 35                |                                    |                  | 35                 |  |
| 40                |                                    |                  | 40                 |  |
| 45                |                                    |                  | 45                 |  |
| 50                |                                    |                  | 50                 |  |
| 55                |                                    |                  | 55                 |  |
| 60                |                                    |                  | 60                 |  |
| 65                |                                    |                  | 65                 |  |
| 70                |                                    |                  | 70                 |  |
| 75                |                                    |                  | 75                 |  |
| 80                |                                    |                  | 80                 |  |
| 85                |                                    |                  | 85                 |  |
| 90                |                                    |                  | 90                 |  |
| 5 ml residue      |                                    |                  | 95                 |  |
| FBP               |                                    |                  | FBP                |  |

Percent Recovery   
 Percent Residue   
 Percent Total Recovery   
 Percent Loss   
 Corrected Percent Recovery   
 Corrected Total Recovery

Comments:

Ambient temperature at the start of the test   
 Ambient barometric pressure at the start of the test   
 Volume of condensate observed in the receiving cylinder at any point in the distillation, expressed as a percentage of the charge volume, in connection with simultaneous temperature reading   
 Temperature measuring device readings which are corrected to 101,3 kPa barometric pressure   
 Sum of the percent recovered and the percent loss   
 Temperature measuring device readings at specified percentages evaporated calculated with arithmetical or graphical procedures   
 Group 0: 2 to 5 minutes   
 Group 1, 2 & 3: 5 to 10 minutes   
 Group 4: 5 to 15 minutes   
 Group 1 & 2: 60 to 100 seconds   
 Group 0: time from first application of heat to 10% recovered = 3 to 4 minutes   
 Group 0, 1, 2, 3 & 4: 4 to 5 ml / min uniform average rate from 5% recovered to 5 ml in flask   
 Volume of condensate observed in the receiving cylinder when the 5ml conditions are reached   
 Volume of condensate observed in the receiving cylinder when the final boiling point is observed   
 Maximum percent recovered   
 Volume of residue in the flask expressed as a percentage of the charge volume   
 Combined Percent Recovery and Percent Residue in the flask   
 Time from 5 ml in flask to FBP = < 5 minutes   
 100 minus the Total Recovery   
 Percent Recovery corrected for barometric pressure   
 Percent Loss corrected for barometric pressure   
 Combined Percent Recovery and Percent Residue in the flask corrected for barometric pressure

FIG. X5.2 Percent Evaporated Report Form



## SUMMARY OF CHANGES

Subcommittee D02.08 has identified the location of selected changes to this standard since the last issue (D 86–05) that may impact the use of this standard. (Approved Jan. 15, 2007.)

- (1) Deleted “natural gasolines” from 1.1.
- (2) Deleted “Group 0” from the entire standard.
- (3) Added Fig. 6.

Subcommittee D02.08 has identified the location of selected changes to this standard since the last issue, (D 86–04b), that may impact the use of this standard. (Approved July 1, 2005.)

- (1) Replaced Table 4 with new values.
- (2) Revised 9.1.2-9.1.2.2, 9.1.5, and Notes 9-11.
- (3) Added 13.5.3 and footnote reference to the research report.
- (4) Added Appendix X5, and cross-reference in Section 12.1.

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# EXHIBIT 7



Designation: D 975 – 07

An American National Standard

## Standard Specification for Diesel Fuel Oils<sup>1</sup>

This standard is issued under the fixed designation D 975; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope\*

1.1 This specification covers seven grades of diesel fuel oils suitable for various types of diesel engines. These grades are described as follows:

1.1.1 *Grade No. 1-D S15*—A special-purpose, light middle distillate fuel for use in diesel engine applications requiring a fuel with 15 ppm sulfur (maximum) and higher volatility than that provided by Grade No. 2-D S15 fuel.<sup>2</sup>

1.1.2 *Grade No. 1-D S500*—A special-purpose, light middle distillate fuel for use in diesel engine applications requiring a fuel with 500 ppm sulfur (maximum) and higher volatility than that provided by Grade No. 2-D S500 fuel.<sup>2</sup>

1.1.3 *Grade No. 1-D S5000*—A special-purpose, light middle distillate fuel for use in diesel engine applications requiring a fuel with 5000 ppm sulfur (maximum) and higher volatility than that provided by Grade No. 2-D S5000 fuels.

1.1.4 *Grade No. 2-D S15*—A general purpose, middle distillate fuel for use in diesel engine applications requiring a fuel with 15 ppm sulfur (maximum). It is especially suitable for use in applications with conditions of varying speed and load.<sup>2</sup>

1.1.5 *Grade No. 2-D S500*—A general-purpose, middle distillate fuel for use in diesel engine applications requiring a fuel with 500 ppm sulfur (maximum). It is especially suitable for use in applications with conditions of varying speed and load.<sup>2</sup>

1.1.6 *Grade No. 2-D S5000*—A general-purpose, middle distillate fuel for use in diesel engine applications requiring a fuel with 5000 ppm sulfur (maximum), especially in conditions of varying speed and load.

1.1.7 *Grade No. 4-D*—A heavy distillate fuel, or a blend of distillate and residual oil, for use in low- and medium-speed diesel engines in applications involving predominantly constant speed and load.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.E0.02 on Diesel Fuel Oils.

Current edition approved Feb. 1, 2007. Published March 2007. Originally approved in 1948. Last previous edition approved in 2006 as D 975-06b.

<sup>2</sup> This fuel complies with 40 CFR Part 80—Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engines and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements: Final Rule. Regulation of Fuels and Fuel Additives: Fuel Quality Regulations for Highway Diesel Fuel Sold in 1993 and Later Calendar Years.

NOTE 1—A more detailed description of the grades of diesel fuel oils is given in XI.2.

NOTE 2—The Sxxx designation has been adopted to distinguish grades by sulfur rather than using words such as “Low Sulfur” as previously because the number of sulfur grades is growing and the word descriptions were thought to be not precise. S5000 grades correspond to the so-called “regular” sulfur grades, the previous No. 1-D and No. 2-D, S500 grades correspond to the previous “Low Sulfur” grades. S15 grades were not in the previous grade system and are commonly referred to as “Ultra-Low Sulfur” grades or ULSD.

1.2 This specification, unless otherwise provided by agreement between the purchaser and the supplier, prescribes the required properties of diesel fuels at the time and place of delivery.

1.2.1 Nothing in this specification shall preclude observance of federal, state, or local regulations which may be more restrictive.

NOTE 3—The generation and dissipation of static electricity can create problems in the handling of distillate diesel fuel oils. For more information on the subject, see Guide D 4865.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>3</sup>

- D 56 Test Method for Flash Point by Tag Closed Cup Tester
- D 86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure
- D 93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D 129 Test Method for Sulfur in Petroleum Products (General Bomb Method)
- D 130 Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- D 482 Test Method for Ash from Petroleum Products

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

\*A Summary of Changes section appears at the end of this standard.

D 524 Test Method for Ramsbottom Carbon Residue of Petroleum Products  
 D 613 Test Method for Cetane Number of Diesel Fuel Oil  
 D 1266 Test Method for Sulfur in Petroleum Products (Lamp Method)  
 D 1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption  
 D 1552 Test Method for Sulfur in Petroleum Products (High-Temperature Method)  
 D 1796 Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)  
 D 2274 Test Method for Oxidation Stability of Distillate Fuel Oil (Accelerated Method)  
 D 2500 Test Method for Cloud Point of Petroleum Products  
 D 2622 Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry  
 D 2709 Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge  
 D 2880 Specification for Gas Turbine Fuel Oils  
 D 2887 Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography  
 D 3117 Test Method for Wax Appearance Point of Distillate Fuels  
 D 3120 Test Method for Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry  
 D 3828 Test Methods for Flash Point by Small Scale Closed Cup Tester  
 D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products  
 D 4177 Practice for Automatic Sampling of Petroleum and Petroleum Products  
 D 4294 Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-ray Fluorescence Spectrometry  
 D 4306 Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination  
 D 4539 Test Method for Filterability of Diesel Fuels by Low-Temperature Flow Test (LTFT)  
 D 4737 Test Method for Calculated Cetane Index by Four Variable Equation  
 D 4865 Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems  
 D 5453 Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence  
 D 5771 Test Method for Cloud Point of Petroleum Products (Optical Detection Stepped Cooling Method)  
 D 5772 Test Method for Cloud Point of Petroleum Products (Linear Cooling Rate Method)  
 D 5773 Test Method for Cloud Point of Petroleum Products (Constant Cooling Rate Method)  
 D 5842 Practice for Sampling and Handling of Fuels for Volatility Measurement  
 D 5854 Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products

D 6078 Test Method for Evaluating Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator (SLBOCLE)  
 D 6079 Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR)  
 D 6217 Test Method for Particulate Contamination in Middle Distillate Fuels by Laboratory Filtration  
 D 6371 Test Method for Cold Filter Plugging Point of Diesel and Heating Fuels  
 D 6468 Test Method for High Temperature Stability of Distillate Fuels  
 D 6469 Guide for Microbial Contamination in Fuels and Fuel Systems  
 D 6890 Test Method for Determination of Ignition Delay and Derived Cetane Number (DCN) of Diesel Fuel Oils by Combustion in a Constant Volume Chamber  
 D 6898 Test Method for Evaluating Diesel Fuel Lubricity by an Injection Pump Rig  
 2.2 *Other Documents:*  
 26 CFR Part 48 Manufacturers and Realtors Excise Taxes<sup>4</sup>  
 40 CFR Part 80 Regulation of Fuels and Fuel Additives<sup>4</sup>

### 3. Terminology

#### 3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *S(numerical specification maximum)*—indicates the maximum sulfur content, in weight ppm (µg/g), allowed by this specification in a diesel fuel grade.

3.1.1.1 *Discussion*—Of the seven diesel fuel grades specified in this standard, six have important distinguishing maximum sulfur regulatory requirements. These are Grades No. 1-D S15, No. 1-D S500, No. 1-D S5000, No. 2-D S15, No. 2-D S500 and No. 2-D S5000. The seventh grade, No. 4-D, is distinguished from these other grades by many major properties in addition to sulfur (unregulated maximum), and therefore is not included in this designation system. Thus, Grade No. 4-D does not have the designation S20000 as part of its grade name.

### 4. Sampling, Containers, and Sample Handling

4.1 It is strongly advised to review all test methods prior to sampling to understand the importance and effects of sampling technique, proper containers, and special handling required for each test method.

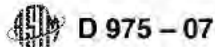
4.2 Correct sampling procedures are critical to obtaining a representative sample of the diesel fuel oil to be tested. Refer to Appendix X2 for recommendations. The recommended procedures or practices provide techniques useful in the proper sampling or handling of diesel fuels.

### 5. Test Methods

5.1 The requirements enumerated in this specification shall be determined in accordance with the following methods:

5.1.1 *Flash Point*—Test Methods D 93, except where other methods are prescribed by law. For all grades, Test Method D 3828 may be used as an alternate with the same limits. For Grades No. 1-D S15, No. 1-D S500, No. 1-D S5000, No. 2-D

<sup>4</sup> Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.



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S15, No. 2-D S500, and No. 2-D S5000, Test Method D 56 may be used as an alternate with the same limits, provided the flash point is below 93°C and the viscosity is below 5.5 mm<sup>2</sup>/s at 40°C. This test method will give slightly lower values. In cases of dispute, Test Methods D 93 shall be used as the referee method. Test Method D 56 can not be used as the alternate method for Grade No. 4-D because its minimum viscosity limit is 5.5 mm<sup>2</sup>/s at 40°C.

5.1.2 *Cloud Point*—Test Method D 2500. For all fuel grades in Table 1, the automatic Test Methods D 5771, D 5772, or

D 5773 can be used as alternates with the same limits. Test Method D 3117 can also be used since it is closely related to Test Method D 2500. In case of dispute, Test Method D 2500 shall be the referee method.

5.1.3 *Water and Sediment*—Test Method D 2709 is used for fuel Grades No. 1-D S15, No. 1-D S500, No. 1-D S5000, No. 2-D S15, No. 2-D S500, and No. 2-D S5000. Test Method D 1796 is used for Grade No. 4-D.

5.1.4 *Carbon Residue*—Test Method D 524 is used for fuel Grades No. 1-D S15, No. 1-D S500, No. 1-D S5000, No. 2-D

TABLE 1 Detailed Requirements for Diesel Fuel Oils<sup>A</sup>

| Property  | ASTM Test Method <sup>B</sup> | Grade           |                           |                            |                  |                             |                              |                      |
|---|-------------------------------|-----------------|---------------------------|----------------------------|------------------|-----------------------------|------------------------------|----------------------|
|   |                               | No. 1-D S15     | No. 1-D S500 <sup>C</sup> | No. 1-D S5000 <sup>C</sup> | No. 2-D S15      | No. 2-D S500 <sup>C,E</sup> | No. 2-D S5000 <sup>C,E</sup> | No. 4-D <sup>D</sup> |
| Flash Point, °C, min.   | D 93                          | 38              | 38                        | 38                         | 52 <sup>E</sup>  | 52 <sup>E</sup>             | 52 <sup>E</sup>              | 55                   |
| Water and Sediment, % vol, max                                      | D 2709<br>D 1796              | 0.05<br>...     | 0.05<br>...               | 0.05<br>...                | 0.05<br>...      | 0.05<br>...                 | 0.05<br>...                  | ...<br>0.50          |
| Distillation: one of the following requirements shall be met:       |                               |                 |                           |                            |                  |                             |                              |                      |
| 1. Physical Distillation  | D 86                          |                 |                           |                            |                  |                             |                              |                      |
| Distillation Temperature, °C 90 %, % vol recovered                  |                               |                 |                           |                            |                  |                             |                              |                      |
| min   |                               | ...             | ...                       | ...                        | 282 <sup>E</sup> | 282 <sup>E</sup>            | 282 <sup>E</sup>             | ...                  |
| max   |                               | 288             | 288                       | 288                        | 338              | 338                         | 338                          | ...                  |
| 2. Simulated Distillation   | D 2887                        |                 |                           |                            |                  |                             |                              |                      |
| Distillation Temperature, °C 90 %, % vol recovered                  |                               |                 |                           |                            |                  |                             |                              |                      |
| min   |                               |                 |                           |                            |                  | 300 <sup>E</sup>            | 300 <sup>E</sup>             |                      |
| max   |                               |                 | 304                       | 304                        |                  | 356                         | 356                          |                      |
| Kinematic Viscosity, mm <sup>2</sup> /S at 40°C                     | D 445                         |                 |                           |                            |                  |                             |                              |                      |
| min   |                               | 1.3             | 1.3                       | 1.3                        | 1.9 <sup>E</sup> | 1.9 <sup>E</sup>            | 1.9 <sup>E</sup>             | 5.5                  |
| max   |                               | 2.4             | 2.4                       | 2.4                        | 4.1              | 4.1                         | 4.1                          | 24.0                 |
| Ash % mass, max   | D 482                         | 0.01            | 0.01                      | 0.01                       | 0.01             | 0.01                        | 0.01                         | 0.10                 |
| Sulfur, ppm (µg/g) <sup>E</sup> max                                 | D 5453                        | 15              | ...                       | ...                        | 15               | ...                         | ...                          | ...                  |
| % mass, max   | D 2822 <sup>G</sup>           | ...             | 0.05                      | ...                        | ...              | 0.05                        | ...                          | ...                  |
| % mass, max   | D 129                         | ...             | ...                       | 0.50                       | ...              | ...                         | 0.50                         | 2.00                 |
| Copper strip corrosion rating max 3 h at 50°C                       | D 130                         | No. 3           | No. 3                     | No. 3                      | No. 3            | No. 3                       | No. 3                        | ...                  |
| Cetane number, min <sup>H</sup>                                     | D 613                         | 40 <sup>I</sup> | 40 <sup>I</sup>           | 40 <sup>I</sup>            | 40 <sup>I</sup>  | 40 <sup>I</sup>             | 40 <sup>I</sup>              | 30 <sup>I</sup>      |
| One of the following properties must be met:                        |                               |                 |                           |                            |                  |                             |                              |                      |
| (1) Cetane index, min.  | D 976-80 <sup>J</sup>         | 40              | 40                        | ...                        | 40               | 40                          | ...                          | ...                  |
| (2) Aromaticity, % vol, max   | D 1319 <sup>K</sup>           | 35              | 35                        | ...                        | 35               | 35                          | ...                          | ...                  |
| Operability Requirements  |                               |                 |                           |                            |                  |                             |                              |                      |
| Cloud point, °C, max  | D 2500                        | ...             | ...                       | ...                        | ...              | ...                         | ...                          | ...                  |
| or  |                               |                 |                           |                            |                  |                             |                              |                      |
| LTFT/CFPP, °C, max  | D 4539/<br>D 6371             | ...             | ...                       | ...                        | ...              | ...                         | ...                          | ...                  |
| Ramsbottom carbon residue on 10 % distillation residue, % mass, max | D 524                         | 0.15            | 0.15                      | 0.15                       | 0.35             | 0.35                        | 0.35                         | ...                  |
| Lubricity, HFRR @ 60°C, micron, max                                 | D 6079                        | 520             | 520                       | 520                        | 520              | 520                         | 520                          | ...                  |

<sup>A</sup> To meet special operating conditions, modifications of individual limiting requirements may be agreed upon between purchaser, seller, and manufacturer.

<sup>B</sup> The test methods indicated are the approved referee methods. Other acceptable methods are indicated in 5.1.

<sup>C</sup> Under United States regulations, if Grades No. 1-D S500 or No. 2-D S500 are sold for tax exempt purposes then, at or beyond terminal storage tanks, they are required by 26 CFR Part 48 to contain the dye Solvent Red 164 at a concentration spectrally equivalent to 3.9 lb per thousand barrels of the solid dye standard Solvent Red 26, or the tax must be collected.

<sup>D</sup> Under United States regulations, Grades No. 1-D S5000, No. 2-D S5000, and No. 4-D are required by 40 CFR Part 80 to contain a sufficient amount of the dye Solvent Red 164 so its presence is visually apparent. At or beyond terminal storage tanks, they are required by 26 CFR Part 48 to contain the dye Solvent Red 164 at a concentration spectrally equivalent to 3.9 lb per thousand barrels of the solid dye standard Solvent Red 26.

<sup>E</sup> When a cloud point less than -12°C is specified, as can occur during cold months, it is permitted and normal blending practice to combine Grades No. 1 and No. 2 to meet the low temperature requirements. In that case, the minimum flash point shall be 38°C, the minimum viscosity at 40°C shall be 1.7 mm<sup>2</sup>/s, and the minimum 90 % recovered temperature shall be waived.

<sup>F</sup> Other sulfur limits can apply in selected areas in the United States and in other countries.

<sup>G</sup> These test methods are specified in 40 CFR Part 80.

<sup>H</sup> Where cetane number by Test Method D 613 is not available, Test Method D 4737 can be used as an approximation.

<sup>I</sup> Low ambient temperatures as well as engine operation at high altitudes may require the use of fuels with higher cetane ratings.

<sup>J</sup> It is unrealistic to specify low temperature properties that will ensure satisfactory operation at all ambient conditions. In general, cloud point (or wax appearance point) Low Temperature Flow Test, and Cold Filter Plugging Point Test may be used as an estimate of operating temperature limits for Grades No. 1-D S500; No. 2-D S500; and No. 1-D S5000 and No. 2-D S5000 diesel fuel oils. However, satisfactory operation below the cloud point (or wax appearance point) may be achieved depending on equipment design, operating conditions, and the use of flow-improver additives as described in X5.1.2. Appropriate low temperature operability properties should be agreed upon between the fuel supplier and purchaser for the intended use and expected ambient temperatures. Test Methods D 4539 and D 6371 may be especially useful to estimate vehicle low temperature operability limits when flow improvers are used. Due to fuel delivery system, engine design, and test method differences, low temperature operability tests may not provide the same degree of protection in various vehicle operating classes. Tenth percentile minimum air temperatures for U.S. locations are provided in Appendix X5 as a means of estimating expected regional temperatures. The tenth percentile minimum air temperatures may be used to estimate expected regional target temperatures for use with Test Methods D 2500, D 4539, and D 6371. Refer to X5.1.3 for further general guidance on test application.



S15, No. 2-D S500 and No. 2-D S5000. Grade No. 4-D does not have a limit for carbon residue.

5.1.5 *Ash*—Test Method D 482 is used for all grades in Table 1.

5.1.6 *Distillation*—Test Method D 86 is used for Grades No. 1-D S15, No. 1-D S500, No. 1-D S5000, No. 2-D S15, No. 2-D S500 and No. 2-D S5000. For all grades, Test Method D 2887 can be used as an alternate with the limits listed in Table 1. In case of dispute, Test Method D 86 shall be the referee method. Grade No. 4-D does not have distillation requirements.

5.1.7 *Viscosity*—Test Method D 445 is used for all fuel grades in Table 1.

5.1.8 *Sulfur*—The following list shows the referee test methods and alternate test methods for sulfur, the range over which each test method applies and the corresponding fuel grades.

| Sulfur Test Method               | Range   | Grades   |
|----------------------------------|---|--|
| D 129 (referee)                  | >0.1 mass %   | No. 1-D S5000, No. 2-D S5000, No. 4-D  |
| D 1266                           | 0.0005 to 0.4 mass %<br>5 to 4000 mg/kg (wt ppm)      | No. 1-D S500, No. 2-D S500   |
| D 1552                           | >0.06 mass %  | No. 1-D S5000, No. 2-D S5000, No. 4-D  |
| D 2622 (referee for S500 Grades) | 0.0003 to 5.3 mass %<br>3 to 53 000 mg/kg (wt ppm)    | All Grades   |
| D 3120                           | 3.0 to 100 mg/kg (wt ppm)                             | No. 1-D S15, No. 2-D S15<br>No. 1-D S500, No. 2-D S500<br>(S500 grades must be diluted before testing) |
| D 4294                           | 0.0150 to 5.00 mass %<br>150 to 50 000 mg/kg (wt ppm) | No. 1-D S5000, No. 2-D S5000, No. 4-D  |
| D 5453 (referee for S15 grades)  | 0.0001 to 0.8 mass %<br>1.0 to 8000 mg/kg (wt ppm)    | All Grades   |

Note 4—The units used to report results in the above test methods are:

|        |            |
|--------|------------|
| D 129  | mass %     |
| D 1266 | mass %     |
| D 1552 | mass %     |
| D 2622 | mass %     |
| D 3120 | ppm (µg/g) |
| D 4294 | mass %     |
| D 5453 | ppm (µg/g) |

Results reported in mg/kg and in ppm (µg/g) are numerically the same. The units used in Table 1 for the sulfur requirements are the units in which results for the referee test are reported.

5.1.9 *Copper Corrosion*—Test Method D 130, 3 h test at 50°C. This test method is used for fuel Grades No. 1-D S15, No. 1-D S500, No. 1-D S5000, No. 2-D S15, No. 2-D S500 and No. 2-D S5000. Grade No. 4-D does not have a copper corrosion requirement.

5.1.10 *Cetane Number*—Test Method D 613 is used for all fuel grades in Table 1. Test Method D 6890 is used for all No. 1-D and No. 2-D grades with the DCN result being compared to the cetane number specification requirement of 40. Test Method D 613 shall be the referee method.

5.1.11 *Cetane Index*—Test Methods D 976–80 is used for fuel Grades No. 1-D S15, No. 1-D S500, No. 2-D S15 and No. 2-D S500. Grades No. 1-D S5000, No. 2-D S5000 and No. 4-D do not have an aromatics content requirement, so do not use this test method as a surrogate for aromatics content.

5.1.12 *Aromaticity*—Test Method D 1319. This test method provides an indication of the aromatics content of fuels. For fuels with a maximum final boiling point of 315°C, this method is a measurement of the aromatic content of the fuel. This test method is used for fuel Grades No. 1-D S15, No. 1-D S500, No. 2-D S15 and No. 2-D S500. Grades No. 1-D S5000, No. 2-D S5000 and No. 4-D do not have an aromatics content requirement.

5.1.13 *Lubricity*—Test Method D 6079.

## 6. Workmanship

6.1 The diesel fuel shall be visually free of undissolved water, sediment, and suspended matter.

## 7. Requirements

7.1 The grades of diesel fuel oils herein specified shall be hydrocarbon oils conforming to the detailed requirements shown in Table 1.

7.2 *Grades No. 2-D S15, No. 2-D S500 and No. 2-D S5000*—When a cloud point less than –12°C is specified, as can occur during cold months, it is permitted and normal blending practice to combine Grades No. 1 and No. 2 to meet the low temperature requirements. In that case, the minimum flash point shall be 38°C, the minimum viscosity at 40°C shall be 1.7 mm<sup>2</sup>/s, and the minimum 90 % recovered temperature shall be waived.

## 8. Keywords

8.1 diesel; fuel oil; petroleum and petroleum products



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## APPENDIXES

(Nonmandatory Information)

### X1. SIGNIFICANCE OF ASTM SPECIFICATION FOR DIESEL FUEL OILS

#### X1.1 Introduction

X1.1.1 The properties of commercial fuel oils depend on the refining practices employed and the nature of the crude oils from which they are produced. Distillate fuel oils, for example, may be produced within the boiling range of 150 and 400°C having many possible combinations of various properties, such as volatility, ignition quality, viscosity, and other characteristics.

#### X1.2 Grades

X1.2.1 This specification is intended as a statement of permissible limits of significant fuel properties used for specifying the wide variety of commercially available diesel fuel oils. Limiting values of significant properties are prescribed for seven grades of diesel fuel oils. These grades and their general applicability for use in diesel engines are broadly indicated as follows:

X1.2.2 *Grade No. 1-D S15*—Grade No. 1-D S15 comprises the class of very low sulfur, volatile fuel oils from kerosine to the intermediate middle distillates. Fuels within this grade are applicable for use in (1) high-speed diesel engines and diesel engine applications that require ultra-low sulfur fuels, (2) applications necessitating frequent and relatively wide variations in loads and speeds, and (3) applications where abnormally low operating temperatures are encountered.

X1.2.3 *Grade No. 1-D S500*—Grade No. 1-D S500 comprises the class of low-sulfur, volatile fuel oils from kerosine to the intermediate middle distillates. Fuels within this grade are applicable for use in (1) high-speed diesel engines that require low sulfur fuels, (2) in applications necessitating frequent and relatively wide variations in loads and speeds, and (3) in applications where abnormally low operating temperatures are encountered.

X1.2.4 *Grade No. 1-D S5000*—Grade No. 1-D S5000 comprises the class of volatile fuel oils from kerosine to the intermediate middle distillates. Fuels within this grade are applicable for use in high-speed diesel engines applications necessitating frequent and relatively wide variations in loads and speeds, and also for use in cases where abnormally low operating temperatures are encountered.

X1.2.5 *Grade No. 2-D S15*—Grade No. 2-D S15 includes the class of very low sulfur, middle distillate gas oils of lower volatility than Grade No. 1-D S15. These fuels are applicable for use in (1) high speed diesel engines and diesel engine applications that require ultra-low sulfur fuels, (2) applications necessitating relatively high loads and uniform speeds, or (3) diesel engines not requiring fuels having higher volatility or other properties specified in Grade No. 1-D S15.

X1.2.6 *Grade No. 2-D S500*—Grade No. 2-D S500 includes the class of low-sulfur, middle distillate gas oils of lower volatility than Grade No. 1-D S500. These fuels are applicable for use in (1) high-speed diesel engine applications that require

low sulfur fuels, (2) applications necessitating relatively high loads and uniform speeds, or (3) diesel engines not requiring fuels having higher volatility or other properties specified for Grade No. 1-D S500.

X1.2.7 *Grade No. 2-D S5000*—Grade No. 2-D S5000 includes the class of middle distillate gas oils of lower volatility than Grade No. 1-D S5000. These fuels are applicable for use in (1) high-speed diesel engines in applications necessitating relatively high loads and uniform speeds, or (2) in diesel engines not requiring fuels having higher volatility or other properties specified for Grade No. 1-D S5000.

X1.2.8 *Grade No. 4-D*—Grade No. 4-D comprises the class of more viscous middle distillates and blends of these middle distillates with residual fuel oils. Fuels within this grade are applicable for use in low- and medium-speed diesel engines in applications necessitating sustained loads at substantially constant speed.

#### X1.3 Selection of Particular Grade

X1.3.1 The selection of a particular diesel fuel oil from one of these seven ASTM grades for use in a given engine requires consideration of the following factors:

X1.3.1.1 Fuel price and availability.

X1.3.1.2 Maintenance considerations.

X1.3.1.3 Engine size and design.

X1.3.1.4 Emission control systems.

X1.3.1.5 Speed and load ranges.

X1.3.1.6 Frequency of speed and load changes, and

X1.3.1.7 Atmospheric conditions. Some of these factors can influence the required fuel properties outlined as follows:

#### X1.4 Cetane Number

X1.4.1 Cetane number is a measure of the ignition quality of the fuel and influences combustion roughness. The cetane number requirements depend on engine design, size, nature of speed and load variations, and on starting and atmospheric conditions. Increase in cetane number over values actually required does not materially improve engine performance. Accordingly, the cetane number specified should be as low as possible to assure maximum fuel availability.

#### X1.5 Distillation

X1.5.1 The fuel volatility requirements depend on engine design, size, nature of speed and load variations, and starting and atmospheric conditions. For engines in services involving rapidly fluctuating loads and speeds as in bus and truck operation, the more volatile fuels may provide best performance, particularly with respect to smoke and odor. However, best fuel economy is generally obtained from the heavier types of fuels because of their higher heat content.



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## **X1.6 Viscosity**

X1.6.1 For some engines it is advantageous to specify a minimum viscosity because of power loss due to injection pump and injector leakage. Maximum viscosity, on the other hand, is limited by considerations involved in engine design and size, and the characteristics of the injection system.

## **X1.7 Carbon Residue**

X1.7.1 Carbon residue gives a measure of the carbon depositing tendencies of a fuel oil when heated in a bulb under prescribed conditions. While not directly correlating with engine deposits, this property is considered an approximation.

## **X1.8 Sulfur**

X1.8.1 The effect of sulfur content on engine wear and deposits appears to vary considerably in importance and depends largely on operating conditions. Fuel sulfur can affect emission control systems performance. To assure maximum availability of fuels, the permissible sulfur content should be specified as high as is practicable, consistent with maintenance considerations.

## **X1.9 Flash Point**

X1.9.1 The flash point as specified is not directly related to engine performance. It is, however, of importance in connection with legal requirements and safety precautions involved in fuel handling and storage, and is normally specified to meet insurance and fire regulations.

## **X1.10 Cloud Point**

X1.10.1 Cloud point is of importance in that it defines the temperature at which a cloud or haze of wax crystals appears

in the oil under prescribed test conditions which generally relates to the temperature at which wax crystals begin to precipitate from the oil in use.

## **X1.11 Ash**

X1.11.1 Ash-forming materials may be present in fuel oil in two forms: (1) abrasive solids, and (2) soluble metallic soaps. Abrasive solids contribute to injector, fuel pump, piston and ring wear, and also to engine deposits. Soluble metallic soaps have little effect on wear but may contribute to engine deposits.

## **X1.12 Copper Strip Corrosion**

X1.12.1 This test serves as a measure of possible difficulties with copper and brass or bronze parts of the fuel system.

## **X1.13 Aromaticity**

X1.13.1 This test is used as an indication of the aromatics content of diesel fuel. Aromatics content is specified to prevent an increase in the average aromatics content in Grades No. 1-D S15, No. 1-D S500, No. 2-D S15 and No. 2-D S500 fuels and is required by 40 CFR Part 80. Increases in aromatics content of fuels over current levels may have a negative impact on emissions.

## **X1.14 Cetane Index**

X1.14.1 Cetane Index is specified as a limitation on the amount of high aromatic components in Grades No. 1-D S15, No. 1-D S500, No. 2-D S15 and No. 2-D S500.

## **X1.15 Other**

X1.15.1 *Microbial Contamination*—Refer to Guide D 6469 for a discussion of this form of contamination.

# **X2. SAMPLING, CONTAINERS AND SAMPLE HANDLING**

## **X2.1 Introduction**

X2.1.1 This appendix provides guidance on methods and techniques for the proper sampling of diesel fuel oils. As diesel fuel oil specifications become more stringent and contaminants and impurities become more tightly controlled, even greater care needs to be taken in collecting and storing samples for quality assessment.

## **X2.2 Sampling, Containers and Sample Handling Recommendations**

X2.2.1 Appropriate manual method sampling procedures can be found in Practice D 4057 and automatic method sampling is covered in Practice D 4177.

X2.2.2 The correct sample volume and appropriate container selection are also important decisions that can impact test results. Practice D 4306 for aviation fuel container selec-

tion for tests sensitive to trace contamination may be useful. Practice D 5854 for procedures on container selection and sample mixing and handling is recommended. For cetane number determination protection from light is important. Collection and storage of diesel fuel oil samples in an opaque container, such as a dark brown glass bottle, metal can, or a minimally reactive plastic container to minimize exposure to UV emissions from sources such as sunlight or fluorescent lamps, is recommended. According to Paragraph 8.2 of Test Method D 6079, "Because of sensitivity of lubricity measurements to trace materials, sample containers shall be only fully epoxy-lined metal, amber borosilicate glass, or polytetrafluoroethylene as specified in Practice D 4306."

X2.2.3 For volatility determination of a sample, Practice D 5842 for special precautions recommended for representative sampling and handling techniques may be appropriate.

### X3. STORAGE AND THERMAL STABILITY OF DIESEL FUELS

#### X3.1 Scope

X3.1.1 This appendix provides guidance for consumers of diesel fuels who may wish to store quantities of fuels for extended periods or use the fuel in severe service or high temperature applications. Fuels containing residual components are excluded. Consistently successful long-term fuel storage or use in severe applications requires attention to fuel selection, storage conditions, handling and monitoring of properties during storage and prior to use.

X3.1.2 Normally produced fuels have adequate stability properties to withstand normal storage and use without the formation of troublesome amounts of insoluble degradation products. Fuels that are to be stored for prolonged periods or used in severe applications should be selected to avoid formation of sediments or gums, which can overload filters or plug injectors. Selection of these fuels should result from supplier-user discussions.

X3.1.3 These suggested practices are general in nature and should not be considered substitutes for any requirements imposed by the warranty of the distillate fuel equipment manufacturer or by federal, state, or local government regulations. Although they cannot replace a knowledge of local conditions or good engineering and scientific judgment, these suggested practices do provide guidance in developing an individual fuel management system for the middle distillate fuel user. They include suggestions in the operation and maintenance of existing fuel storage and handling facilities and for identifying where, when, and how fuel quality should be monitored or selected for storage or severe use.

#### X3.2 Definitions

X3.2.1 *bulk fuel*—fuel in the storage facility.

X3.2.2 *fuel contaminants*—foreign materials that make fuel less suitable or unsuitable for the intended use.

X3.2.2.1 *Discussion*—Fuel contaminants include materials introduced subsequent to the manufacture of fuel and fuel degradation products.

X3.2.3 *fuel-degradation products*—those materials that are formed in fuel during extended storage or exposure to high temperatures.

X3.2.3.1 *Discussion*—Insoluble degradation products may combine with other fuel contaminants to reinforce deleterious effects. Soluble degradation products (soluble gums) are less volatile than fuel and may carbonize to form deposits due to complex interactions and oxidation of small amounts of olefinic or sulfur-, oxygen- or nitrogen-containing compounds present in fuels. The formation of degradation products may be catalyzed by dissolved metals, especially copper salts. When dissolved copper is present it can be deactivated with metal deactivator additives.

X3.2.4 *long-term storage*—storage of fuel for longer than 12 months after it is received by the user.

X3.2.5 *severe use*—use of the fuel in applications which may result in engines operating under high load conditions that may cause the fuel to be exposed to excessive heat.

#### X3.3 Fuel Selection

X3.3.1 Certain distilled refinery products are generally more suitable for long-term storage and severe service than others. The stability properties of middle distillates are highly dependent on the crude oil sources, severity of processing, use of additives and whether additional refinery treatment has been carried out.

X3.3.2 The composition and stability properties of middle distillate fuels produced at specific refineries may be different. Any special requirements of the user, such as long-term storage or severe service, should be discussed with the supplier.

X3.3.3 Blends of fuels from various sources may interact to give stability properties worse than expected based on the characteristics of the individual fuels.

#### X3.4 Fuel Additives

X3.4.1 Available fuel additives can improve the suitability of marginal fuels for long-term storage and thermal stability, but may be unsuccessful for fuels with markedly poor stability properties. Most additives should be added at the refinery or during the early weeks of storage to obtain maximum benefits.

X3.4.2 Biocides or biostats destroy or inhibit the growth of fungi and bacteria, which can grow at fuel-water interfaces to give high particulate concentrations in the fuel. Available biocides are soluble in both the fuel and water or in the water phase only.

#### X3.5 Tests for Fuel Quality

X3.5.1 At the time of manufacture, the storage stability of fuel may be assessed using Test Method D 2274 or D 5304. However, these accelerated stability tests may not correlate well with field storage stability due to varying field conditions and to fuel composition.

X3.5.2 Performance criteria for accelerated stability tests that assure satisfactory long-term storage of fuels have not been established.

X3.5.3 Test Method D 6468, provides an indication of thermal oxidative stability of middle distillate fuels when heated to temperatures near 150°C.

#### X3.6 Fuel Monitoring

X3.6.1 A plan for monitoring the quality of bulk fuel during prolonged storage is an integral part of a successful program. A plan to replace aged fuel with fresh product at established intervals is also desirable.

X3.6.2 Stored fuel should be periodically sampled and its quality assessed. Practice D 4057 provides guidance for sampling. Fuel contaminants and degradation products will usually settle to the bottom of a quiescent tank. A “Bottom” or “Clearance” sample, as defined in Practice D 4057, should be included in the evaluation along with an “All Level” sample.

X3.6.3 The quantity of insoluble fuel contaminants present in fuel can be determined using Test Method D 6217.

X3.6.4 Test Method D 6468, can be used for investigation of operational problems that might be related to fuel thermal

stability. Testing samples from the fuel tank or from bulk storage may give an indication as to the cause of filter plugging. It is more difficult to monitor the quality of fuels in vehicle tanks since operation may be on fuels from multiple sources.

X3.6.5 Some additives exhibit effects on fuels tested in accordance with Test Method D 6468 that may or may not be observed in the field. Data have not been developed that correlate results from the test method for various engine types and levels of operating severity.

### X3.7 Fuel Storage Conditions

X3.7.1 Contamination levels in fuel can be reduced by storage in tanks kept free of water, and tankage should have provisions for water draining on a scheduled basis. Water promotes corrosion, and microbiological growth may occur at a fuel-water interface. Underground storage is preferred to avoid temperature extremes; above-ground storage tanks should be sheltered or painted with reflective paint. High storage temperatures accelerate fuel degradation. Fixed roof tanks should be kept full to limit oxygen supply and tank breathing.

X3.7.2 Copper and copper-containing alloys should be avoided. Copper can promote fuel degradation and may produce mercaptide gels. Zinc coatings can react with water or organic acids in the fuel to form gels that rapidly plug filters.

X3.7.3 Appendix X2 of Specification D 2880 discusses fuel contaminants as a general topic.

### X3.8 Fuel Use Conditions

X3.8.1 Many diesel engines are designed so that the diesel fuel is used for heat transfer. In modern heavy-duty diesel engines, for example, only a portion of the fuel that is circulated to the fuel injectors is actually delivered to the combustion chamber. The remainder of the fuel is circulated back to the fuel tank, carrying heat with it. Thus adequate high temperature stability can be a necessary requirement in some severe applications or types of service.

X3.8.2 Inadequate high temperature stability may result in the formation of insoluble degradation products.

### X3.9 Use of Degraded Fuels

X3.9.1 Fuels that have undergone mild-to-moderate degradation can often be consumed in a normal way, depending on

the fuel system requirements. Filters and other cleanup equipment can require special attention and increased maintenance. Burner nozzle or injector fouling can occur more rapidly.

X3.9.2 Fuels containing very large quantities of fuel degradation products and other contaminants or with runaway microbiological growth require special attention. Consultation with experts in this area is desirable. It can be possible to drain the sediment or draw off most of the fuel above the sediment layer and use it with the precautions described in X3.9.1. However, very high soluble gum levels or corrosion products from microbiological contamination can cause severe operational problems.

### X3.10 Thermal Stability Guidelines

X3.10.1 Results from truck fleet experience suggests that Test Method D 6468 can be used to qualitatively indicate whether diesel fuels have satisfactory thermal stability performance properties.<sup>5,6</sup>

X3.10.2 Performance in engines has not been sufficiently correlated with results from Test Method D 6468 to provide definitive specification requirements. However, the following guidelines are suggested.

X3.10.2.1 Fuels giving a Test Method D 6468 reflectance value of 70 % or more in a 90 minute test at the time of manufacture should give satisfactory performance in normal use.

X3.10.2.2 Fuels giving a Test Method D 6468 reflectance value of 80 % or more in a 180 minute test at the time of manufacture should give satisfactory performance in severe use.

X3.10.3 Thermal stability as determined by Test Method D 6468 is known to degrade during storage.<sup>7</sup> The guidance above is for fuels used within six months of manufacture.

<sup>5</sup> Bacha, John D., and Lesnini, David G., "Diesel Fuel Thermal Stability at 300°F," *Proceedings of the 6th International Conference on Stability and Handling of Liquid Fuels*, Vancouver, B.C., October 1997.

<sup>6</sup> Schwab, Scott D., Henly, Timothy J., Moxley, Joel F., and Miller, Keith, "Thermal Stability of Diesel Fuel," *Proceedings of the 7th International Conference on Stability and Handling of Liquid Fuels*, Graz, Austria September 2000.

<sup>7</sup> Henry, C. P., "The DuPont F21 149°C (300°F) Accelerated Stability Test," *Distillate Fuel Stability and Cleanliness*, ASTM STP 751, 1981, pp. 22-33.

## X4. DIESEL FUEL LUBRICITY

### X4.1 Introduction

X4.1.1 Diesel fuel functions as a lubricant in most components of fuel injection equipment such as pumps and injectors. In limited cases, fuel with specific properties will have insufficient lubricating properties which will lead to a reduction in the normal service life and functional performance of diesel fuel injection systems.

### X4.2 Fuel Characteristics Affecting Equipment Wear

X4.2.1 Currently, two fuel characteristics affect equipment wear. These are low viscosity and lack of sufficient quantities of trace components that have an affinity for surfaces. If fuel viscosity meets the requirements of a particular engine, a fuel film is maintained between the moving surfaces of the fuel system components. This prevents excessive metal-to-metal

contact and avoids premature failure due to wear. Similarly, certain surface active molecules in the fuel adhere to, or combine with, surfaces to produce a protective film which also can protect surfaces against excessive wear.

#### X4.3 Fuel Lubricity

X4.3.1 The concern about fuel lubricity is limited to situations in which fuels with lower viscosities than those specified for a particular engine are used or in which fuels that have been processed in a manner that results in severe reduction of the trace levels of the surface active species that act as surface protecting agents. Presently the only fuels of the latter type shown to have lubricity problems resulted from sufficiently severe processing to reduce aromatics or sulfur.

X4.3.2 Work in the area of diesel fuel lubricity is ongoing by several organizations, such as the International Organization for Standardization (ISO), the ASTM Diesel Fuel Lubricity Task Force, and the Coordinating Research Council (CRC) Diesel Performance Group. These groups include representatives from the fuel injection equipment manufacturers, fuel producers, and additive suppliers. The charge of the ASTM task force has been the recommendation of test methods and fuel lubricity requirements for Specification D 975. Two test methods were proposed and approved. These are Test Method D 6078, a scuffing load ball-on-cylinder lubricity evaluator method, SLBOCLE, and Test Method D 6079, a high frequency reciprocating rig (HFRR) method. Use of these tests raises three issues: 1) The correlation of the data among the two test methods and the fuel injection equipment is not

perfect, 2) Both methods in their current form do not apply to all fuel-additive combinations, and 3) The reproducibility values for both test methods are large. In order to protect diesel fuel injection equipment, an HFRR Wear Scar Diameter (WSD) of 520 microns has been placed in Specification D 975.<sup>8</sup>

X4.3.3 Most experts agree that fuels having a SLBOCLE lubricity value below 2000 g might not prevent excessive wear in injection equipment<sup>9</sup> while fuels with values above 3100 g should provide sufficient lubricity in all cases.<sup>10</sup> Experts also agree that if HFRR test at 60°C is used, fuels with values above 600 microns might not prevent excessive wear,<sup>11</sup> while fuels with values below 450 microns should provide sufficient lubricity in all cases.<sup>10</sup> More accurately, an industry-accepted long-term durability pump test, such as Test Method D 6898, can be used to evaluate the lubricity of a diesel fuel. A poor result in such a test indicates that the fuel has low lubricity and may not be able to provide sufficient protection.

NOTE X4.1—Some injection equipment can be fitted with special components that can tolerate low lubricity fuels.

<sup>8</sup> Mitchell, K., "Diesel Fuel Lubricity—Base Fuel Effects," SAE Technical Paper 2001-01-1928, 2001.

<sup>9</sup> Westbrook, S. R., "Survey of Low Sulfur Diesel Fuels and Aviation Kerosenes from U.S. Military Installations," SAE Technical Paper 952369, 1995.

<sup>10</sup> Nikanjam, M., "ISO Diesel Fuel Lubricity Round Robin Program," SAE Technical Paper 952372, 1995.

<sup>11</sup> Nikanjam, M., "Diesel Fuel Lubricity: On the Path to Specifications," SAE Technical Paper 1999-01-1479, 1999.

## X5. TENTH PERCENTILE MINIMUM AMBIENT AIR TEMPERATURES FOR THE UNITED STATES (EXCEPT HAWAII)

### X5.1 Introduction

X5.1.1 The tenth percentile minimum ambient air temperatures shown on the following maps (Figs. X5.1-X5.12) and in Table X5.1 were derived from an analysis of historical hourly temperature readings recorded over a period of 15 to 21 years from 345 weather stations in the United States. This study was conducted by the U.S. Army Mobility Equipment Research and Development Center (USAMERDC), Coating and Chemical Laboratory, Aberdeen Proving Ground, MD 21005. The tenth percentile minimum ambient air temperature is defined as the lowest ambient air temperature which will not go lower on average more than 10 % of the time. In other words, the daily minimum ambient air temperature would on average not be expected to go below the monthly tenth percentile minimum ambient air temperature more than 3 days for a 30-day month. See Table X5.1.

X5.1.2 These data may be used to estimate low temperature operability requirements. In establishing low temperature operability requirements, consideration should be given to the following. These factors, or any combination, may make low temperature operability more or less severe than normal. As X5.1.2.1 through X5.1.2.12 indicate, field work suggests that cloud point (or wax appearance point) is a fair indication of the

low temperature operability limit of fuels without cold flow additives in most vehicles.

X5.1.2.1 Long term weather patterns (Average winter low temperatures will be exceeded on occasion).

X5.1.2.2 Short term local weather conditions (Unusual cold periods do occur).

X5.1.2.3 Elevation (High locations are usually colder than surrounding lower areas).

X5.1.2.4 Specific engine design.

X5.1.2.5 Fuel system design (Recycle rate, filter location, filter capacity, filter porosity, and so forth.)

X5.1.2.6 Fuel viscosity at low temperatures

X5.1.2.7 Equipment add-ons (Engine heaters, radiator covers, fuel line and fuel filter heaters and so forth.)

X5.1.2.8 Types of operation (Extensive idling, engine shutdown, or unusual operation).

X5.1.2.9 Low temperature flow improver additives in fuel.

X5.1.2.10 Geographic area for fuel use and movement between geographical areas.

X5.1.2.11 General housekeeping (Dirt and/or water in fuel or fuel supply system).

X5.1.2.12 Impact failure for engine to start or run (Critical vs. non-critical application).

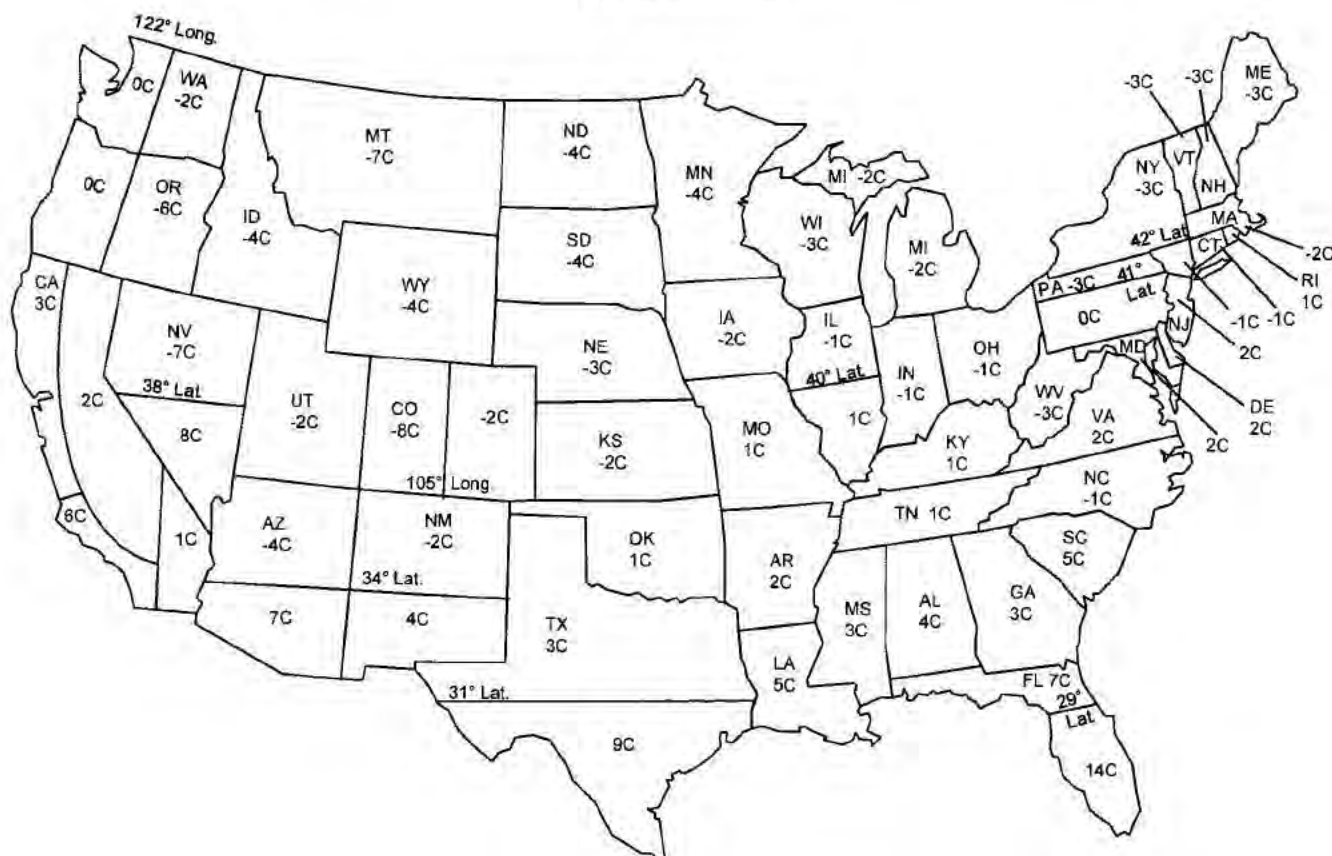


FIG. X5.1 October—10th Percentile Minimum Temperatures

**X5.1.3 Historical Background**—Three test methods have been widely used to estimate or correlate with low temperature vehicle operability. Cloud point, Test Method D 2500, is the oldest of the three and most conservative of the tests. The cloud point test indicates the earliest appearance of wax precipitation that might result in plugging of fuel filters or fuel lines under prescribed cooling conditions. Although not 100 % failsafe, it is the most appropriate test for applications that can not tolerate much risk. The Cold Filter Plugging Point (CFPP) test, Test Method D 6371, was introduced in Europe in 1965. The CFPP was designed to correlate with the majority of European vehicles. Under rapid cooling conditions, 20 cc fuel is drawn through a 45 micron screen then allowed to flow back through the screen for further cooling. This process is continued every 1°C until either the 20 cc fuel fails to be drawn through the screen in 60 s or it fails to return through the screen in 60 s. It was field tested many times in Europe<sup>12</sup> before being widely accepted as a European specification. Field tests have also shown CFPP results more than 10°C below the cloud point should be viewed with caution because those results did not necessarily reflect the true vehicle low temperature operability limits.<sup>13</sup> CFPP has been applied to many areas of the world

where similar vehicle designs are used. The Low Temperature Flow Test (LTFT), Test Method D 4539, was designed to correlate with the most severe and one of the most common fuel delivery systems used in North American Heavy Duty trucks. Under prescribed slow cool conditions (1°C/h), similar to typical field conditions, several 200 cc fuel specimens in glass containers fitted with 17 µm screen assemblies are cooled. At 1°C intervals one specimen is drawn through the screen under a 20 kPa vacuum. Approximately 90 % of the fuel must come over in 60 s or less for the result to be a pass. This process is continued at lower temperatures (1°C increments) until the fuel fails to come over in the allotted 60 s. The lowest passing temperature is defined as the LTFT for that fuel. In 1981, a CRC program was conducted to evaluate the efficacy of cloud point, CFPP, pour point, and LTFT for protecting the diesel vehicle population in North America and to determine what benefit flow-improvers could provide. The field test consisted of 3 non-flow improved diesel fuels, 5 flow improved diesel fuels, 4 light-duty passenger cars, and 3 heavy-duty trucks. The field trial resulted in two documents<sup>14,15</sup> that provide insight into correlating laboratory tests to North

<sup>12</sup> "Low Temperature Operability of Diesels. A Report by CEC Investigation Group IGF-3," CEC P-171-82.

<sup>13</sup> "SFPP-A New Laboratory Test for Assessment of Low Temperature Operability of Modern Diesel Fuels," CEC/93/EF 15, 5-7, May 1993.

<sup>14</sup> CRC Report No. 537, "The Relationship Between Vehicle Fuel Temperature and Ambient Temperature, 1981 CRC Kapuskasing Field Test," December 1983.

<sup>15</sup> CRC Report No. 528, "1981 CRC Diesel Fuel Low-Temperature Operability Field Test," September 1983.

D 975 - 07

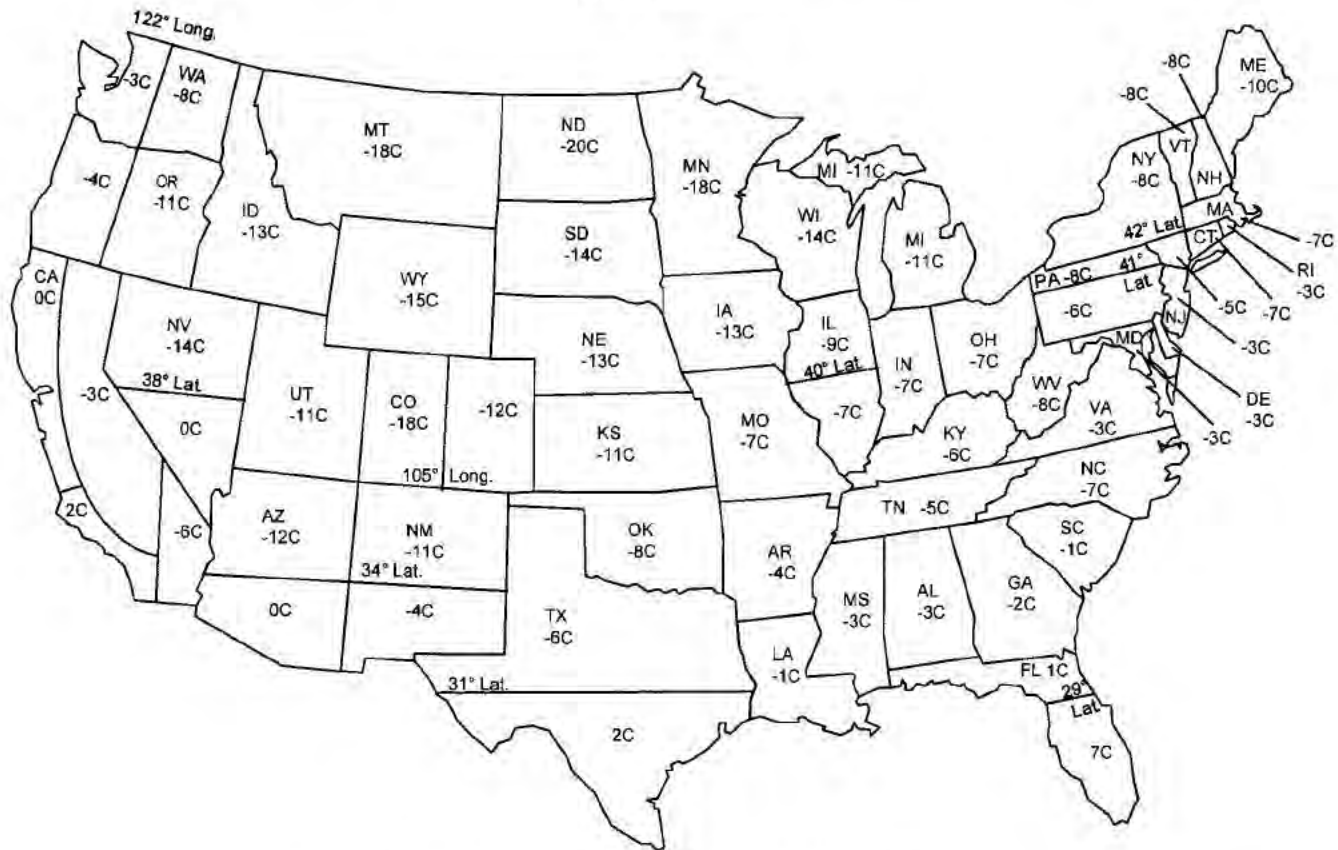


FIG. X5.2 November—10th Percentile Minimum Ambient Air Temperatures

American vehicle performance in the field. The general conclusions of the study were:

- (1) In overnight cool down, 30 % of the vehicles tested had a final fuel tank temperature within 2°C of the overnight minimum ambient temperature.
- (2) The use of flow-improved diesel fuel permits some vehicles to operate well below the fuel cloud point.
- (3) Significant differences exist in the severity of diesel vehicles in terms of low temperature operation.
- (4) No single laboratory test was found that adequately predicts the performance of all fuels in all vehicles.
- (5) CFPP was a better predictor than pour point, but both methods over-predicted, minimum operating temperatures in many vehicles. For this reason, these tests were judged inadequate predictors of low-temperature performance and dismissed from further consideration.
- (6) Cloud point and LTFT showed varying degrees of predictive capability, and offered distinctively different advantages. Both predicted the performance of the base fuels well, but LTFT more accurately predicted the performance of the flow-improved fuels. On the other hand, cloud point came closest to a fail-safe predictor of vehicle performance for all vehicles.

Since the 1981 field test, non-independent studies<sup>16</sup> using newer vehicles verified the suitability of the LTFT for North American heavy-duty trucks. Users are advised to review these and any more recent publications when establishing low temperature operability requirements and deciding upon test methods.

**X5.1.3.1 Current Practices**—It is recognized that fuel distributors, producers, and end users in the United States use cloud point, wax appearance point, CFPP, and LTFT to estimate vehicle low temperature operability limits for diesel fuel. No independent data has been published in recent years to determine test applicability for today's fuels and vehicles.

## X5.2 Maps

**X5.2.1** The maps in the following figures were derived from CCL Report No. 316, "A Predictive Study for Defining Limiting Temperatures and Their Application in Petroleum Product Specifications," by John P. Doner. This report was published by the U.S. Army Mobility Equipment Research and Development Center (USAMERDC), Coating and Chemical Laboratory, and it is available from the National Technical

<sup>16</sup> SAE 962197, SAE 982576, SAE 2000-01-2883.

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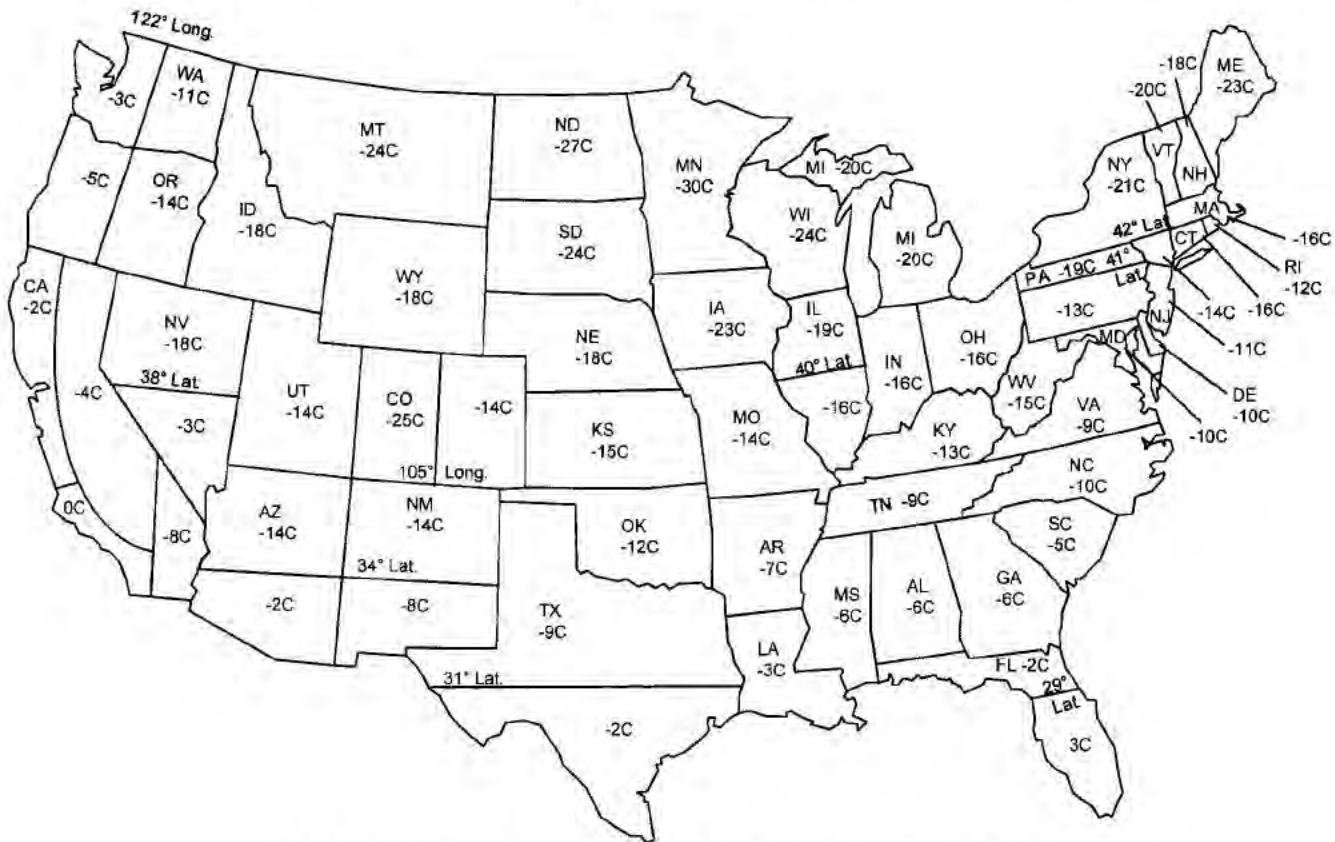


FIG. X5.3 December—10th Percentile Minimum Ambient Air Temperatures

Information Service, Springfield, VA 22151, by requesting Publication No. AD756-420.

X5.2.2 Where states are divided the divisions are noted on the maps and table with the exception of California, which is divided by counties as follows:

California, North Coast—Alameda, Contra Costa, Del Norte, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Trinity.

California, Interior—Lassen, Modoc, Plumas, Sierra, Siskiyou, Alpine, Amador, Butte, Calaveras, Colusa, El Dorado, Fresno, Glenn, Kern (except that portion lying east of the Los Angeles County Aqueduct), Kings, Madera, Mariposa, Merced, Placer, Sacramento, San Joaquin, Shasta, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba, Nevada.

California, South Coast—Orange, San Diego, San Luis Obispo, Santa Barbara, Ventura, Los Angeles (except that portion north of the San Gabriel Mountain range and east of the Los Angeles County Aqueduct).

California, Southeast—Imperial, Riverside, San Bernardino, Los Angeles (that portion north of the San Gabriel Mountain range and east of the Los Angeles County Aqueduct), Mono, Inyo, Kern (that portion lying east of the Los Angeles County Aqueduct).

X5.2.3 The temperatures in CCL Report No. 316 were in degrees Fahrenheit. The degree Celsius temperatures in Appendix X5 were obtained by converting the original degree Fahrenheit temperatures.

D 975 - 07

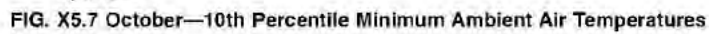
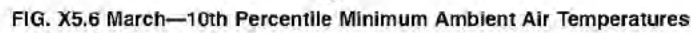


FIG. X5.4 January—10th Percentile Minimum Ambient Air Temperatures

 D 975 – 07



FIG. X5.5 February—10th Percentile Minimum Ambient Air Temperatures



D 975 - 07

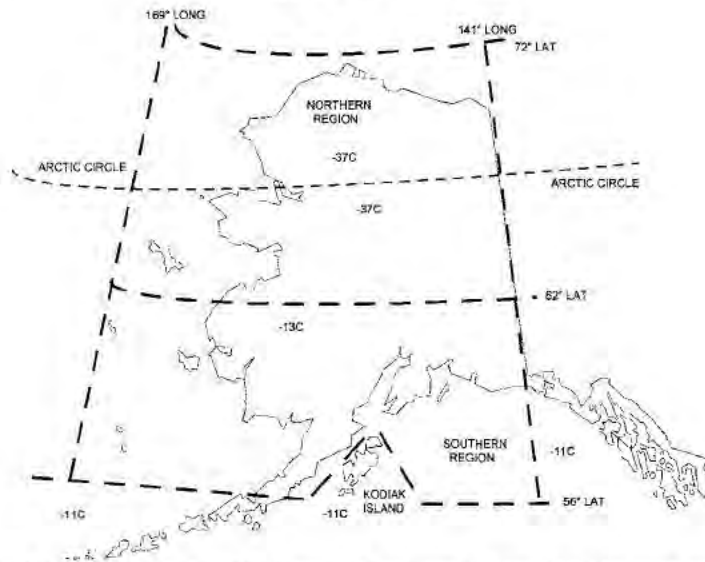


FIG. X5.8 November—10th Percentile Minimum Ambient Air Temperatures

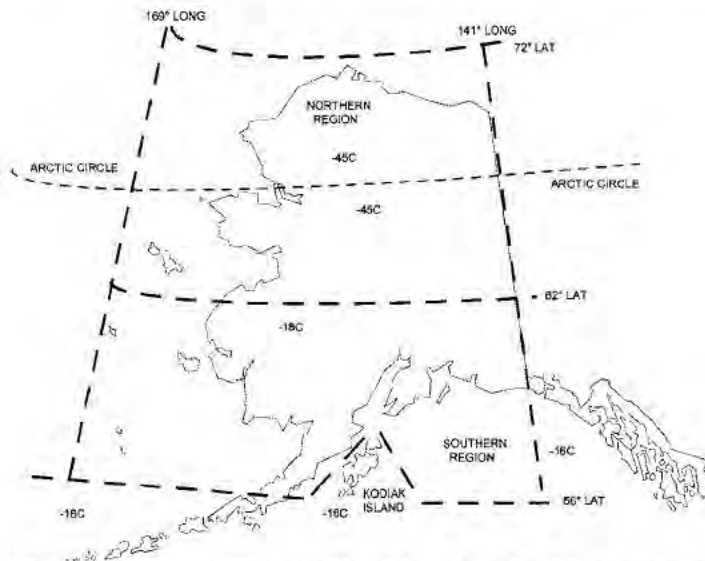


FIG. X5.9 December—10th Percentile Minimum Ambient Air Temperatures

D 975 - 07

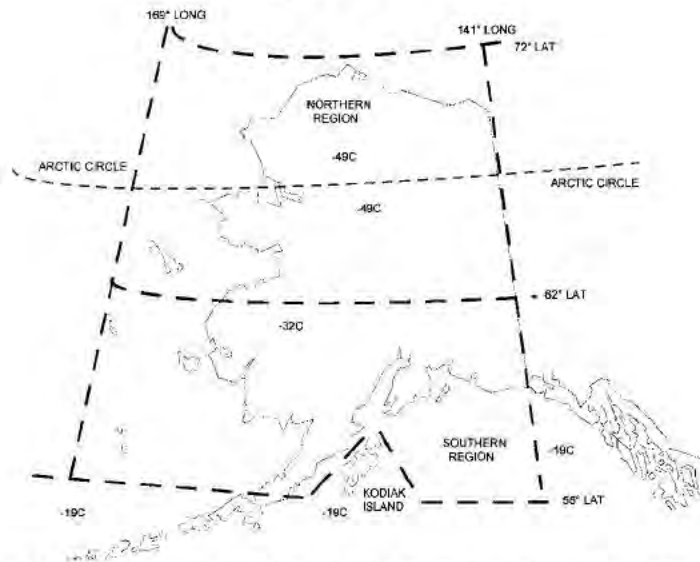


FIG. X5.10 January—10th Percentile Minimum Ambient Air Temperatures

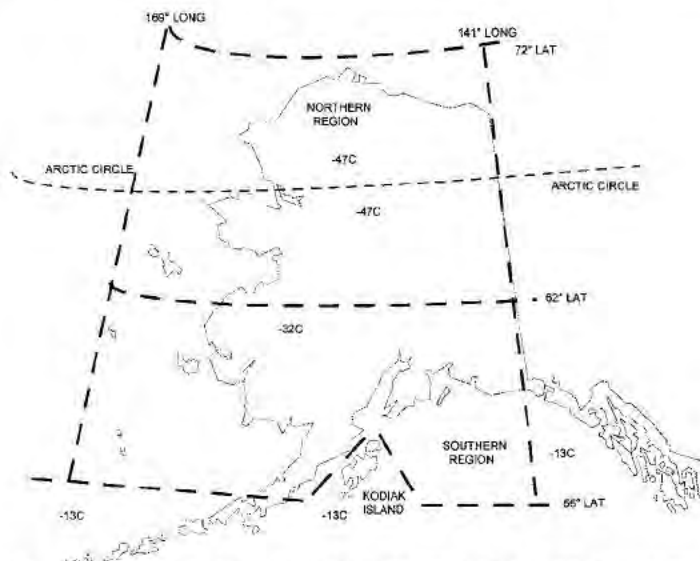


FIG. X5.11 February—10th Percentile Minimum Ambient Air Temperatures

 D 975 - 07

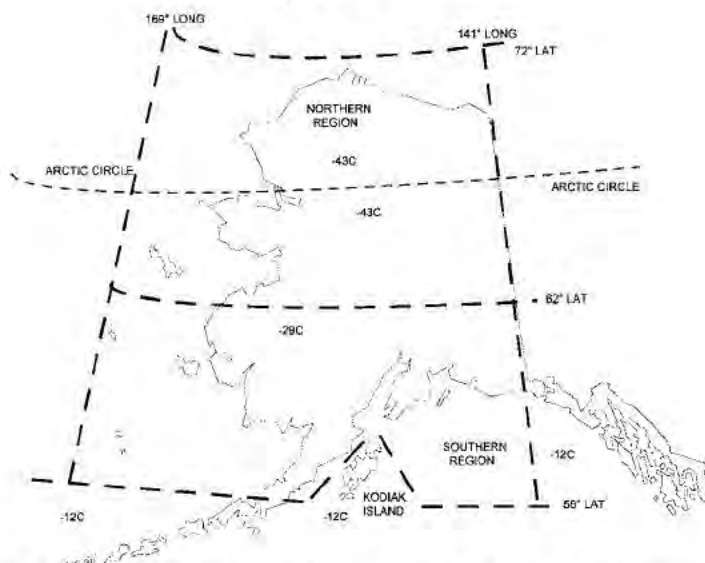


FIG. X5.12 March—10th Percentile Minimum Ambient Air Temperatures



TABLE X5.1 Tenth Percentile Minimum Ambient Air Temperatures for the United States (except Hawaii)

| State          |                    | 10th Percentile Temperature °C, min |      |      |      |      |       |
|----------------|--------------------|-------------------------------------|------|------|------|------|-------|
|                |                    | Oct.                                | Nov. | Dec. | Jan. | Feb. | March |
| Alabama        |                    | 4                                   | -3   | -6   | -7   | -3   | -2    |
| Alaska         | Northern           | -25                                 | -37  | -45  | -49  | -47  | -43   |
|                | Southern           | -11                                 | -13  | -18  | -32  | -32  | -29   |
|                | South East         | -4                                  | -11  | -15  | -19  | -13  | -12   |
| Arizona        | North 34° latitude | -4                                  | -12  | -14  | -17  | -16  | -12   |
|                | South 34° latitude | 7                                   | 0    | -2   | -4   | -3   | -1    |
| Arkansas       |                    | 2                                   | -4   | -7   | -11  | -7   | -3    |
| California     | North Coast        | 3                                   | 0    | -2   | -2   | -1   | -1    |
|                | Interior           | 2                                   | -3   | -4   | -7   | -6   | -6    |
|                | South Coast        | 6                                   | 2    | 0    | -1   | 0    | 2     |
|                | Southeast          | 1                                   | -6   | -8   | -11  | -7   | -5    |
| Colorado       | East 105° long     | -2                                  | -12  | -14  | -19  | -15  | -12   |
|                | West 105° long     | -3                                  | -18  | -25  | -30  | -24  | -16   |
| Connecticut    |                    | -1                                  | -7   | -16  | -17  | -16  | -9    |
| Delaware       |                    | 2                                   | -3   | -10  | -11  | -10  | -6    |
| Florida        | North 29° latitude | 7                                   | 1    | -2   | -3   | -1   | 2     |
|                | South 29° latitude | 14                                  | 7    | 3    | 3    | 5    | 7     |
| Georgia        |                    | 3                                   | -2   | -6   | -7   | -6   | -2    |
| Idaho          |                    | -4                                  | -13  | -18  | -21  | -18  | -13   |
| Illinois       | North 40° latitude | -1                                  | -9   | -19  | -21  | -18  | -11   |
|                | South 40° latitude | 1                                   | -7   | -15  | -17  | -15  | -8    |
| Indiana        |                    | -1                                  | -7   | -16  | -18  | -16  | -9    |
| Iowa           |                    | -2                                  | -13  | -23  | -26  | -22  | -16   |
| Kansas         |                    | -2                                  | -11  | -15  | -19  | -14  | -13   |
| Kentucky       |                    | 1                                   | -6   | -13  | -14  | -11  | -6    |
| Louisiana      |                    | 5                                   | -1   | -3   | -4   | -2   | 1     |
| Maine          |                    | -3                                  | -10  | -23  | -26  | -26  | -18   |
| Maryland       |                    | 2                                   | -3   | -10  | -12  | -10  | -4    |
| Massachusetts  |                    | -2                                  | -7   | -16  | -18  | -17  | -10   |
| Michigan       |                    | -2                                  | -11  | -20  | -23  | -23  | -18   |
| Minnesota      |                    | -4                                  | -18  | -30  | -34  | -31  | -24   |
| Mississippi    |                    | 3                                   | -3   | -6   | -6   | -4   | -1    |
| Missouri       |                    | 1                                   | -7   | -14  | -16  | -13  | -8    |
| Montana        |                    | -7                                  | -18  | -24  | -30  | -24  | -21   |
| Nebraska       |                    | -3                                  | -13  | -18  | -22  | -19  | -13   |
| Nevada         | North 38° latitude | -7                                  | -14  | -18  | -22  | -18  | -13   |
|                | South 38° latitude | 3                                   | 0    | -3   | -4   | -2   | 1     |
| New Hampshire  |                    | -3                                  | -8   | -18  | -21  | -21  | -12   |
| New Jersey     |                    | 2                                   | -3   | -11  | -12  | -11  | -6    |
| New Mexico     | North 34° latitude | -2                                  | -11  | -14  | -17  | -14  | -11   |
|                | South 34° latitude | 4                                   | -4   | -8   | -11  | -7   | -3    |
| New York       | North 42° latitude | -3                                  | -8   | -21  | -24  | -24  | -16   |
|                | South 42° latitude | -1                                  | -5   | -14  | -16  | -15  | -9    |
| North Carolina |                    | -1                                  | -7   | -10  | -11  | -9   | -5    |
| North Dakota   |                    | -4                                  | -20  | -27  | -31  | -29  | -22   |
| Ohio           |                    | -1                                  | -7   | -16  | -17  | -15  | -9    |
| Oklahoma       |                    | 1                                   | -8   | -12  | -13  | -8   | -7    |
| Oregon         | East 122° long     | -6                                  | -11  | -14  | -19  | -14  | -9    |
|                | West 122° long     | 0                                   | -4   | -5   | -7   | -4   | -3    |
| Pennsylvania   | North 41° latitude | -3                                  | -8   | -19  | -20  | -21  | -15   |
|                | South 41° latitude | 0                                   | -6   | -13  | -14  | -14  | -8    |
| Rhode Island   |                    | 1                                   | -3   | -12  | -13  | -13  | -7    |
| South Carolina |                    | 5                                   | -1   | -5   | -5   | -3   | -2    |
| South Dakota   |                    | -4                                  | -14  | -24  | -27  | -24  | -18   |
| Tennessee      |                    | 1                                   | -5   | -9   | -11  | -9   | -4    |
| Texas          | North 31° latitude | 3                                   | -6   | -9   | -13  | -9   | -7    |
|                | South 31° latitude | 9                                   | 2    | -2   | -3   | -1   | 2     |
| Utah           |                    | -2                                  | -11  | -14  | -18  | -14  | -8    |
| Vermont        |                    | -3                                  | -8   | -20  | -23  | -24  | -15   |
| Virginia       |                    | 2                                   | -3   | -9   | -11  | -9   | -4    |
| Washington     | East 122° long     | -2                                  | -8   | -11  | -18  | -11  | -6    |
|                | West 122° long     | 0                                   | -3   | -3   | -7   | -4   | -3    |
| West Virginia  |                    | -3                                  | -8   | -15  | -16  | -14  | -9    |
| Wisconsin      |                    | -3                                  | -14  | -24  | -28  | -24  | -18   |
| Wyoming        |                    | -4                                  | -15  | -18  | -26  | -19  | -16   |



## SUMMARY OF CHANGES

Subcommittee D02.E0.02 has identified the location of selected changes to this standard since the last issue (D 975–06b) that may impact the use of this standard. (Approved Feb. 1, 2007.)

- (1) Added standards to the Referenced Documents.
- (2) Added Section 4.
- (3) Added X2.2.2.

Subcommittee D02.E0.02 has identified the location of selected changes to this standard since the last issue (D 975–06a) that may impact the use of this standard. (Approved Nov. 1, 2006.)

- (1) Revised Appendix X4.

Subcommittee D02.E0.02 has identified the location of selected changes to this standard since the last issue (D 975–06) that may impact the use of this standard. (Approved Oct. 1, 2006.)

- (1) Added Test Method D 6890.
- (2) Revised 5.1.10.

Subcommittee D02.E0.02 has identified the location of selected changes to this standard since the last issue (D 975–05) that may impact the use of this standard. (Approved May 15, 2006.)

- (1) Deleted Test Method D 6920 from this standard.

Subcommittee D02.E0.02 has identified the location of selected changes to this standard since the last issue (D 975–04c<sup>1</sup>) that may impact the use of this standard. (Approved June 1, 2005.)

- (1) Removed footnote J from Grade No. 4–D in Table 1.

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# EXHIBIT 8



Designation: D 396 – 98

An American National Standard

AMERICAN SOCIETY FOR TESTING AND MATERIALS  
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## Standard Specification for Fuel Oils<sup>1</sup>

This standard is issued under the fixed designation D 396; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This specification (Note 1) covers grades of fuel oil intended for use in various types of fuel-oil-burning equipment under various climatic and operating conditions. These grades are described as follows:

1.1.1 Grades 1 and 2 are distillate fuels for use in domestic and small industrial burners. Grade 1 is particularly adapted to vaporizing type burners or where storage conditions require low pour point fuel.

1.1.2 Grades 4 (Light) and 4 are heavy distillate fuels or distillate/residual fuel blends used in commercial/industrial burners equipped for this viscosity range.

1.1.3 Grades 5 (Light), 5 (Heavy), and 6 are residual fuels of increasing viscosity and boiling range, used in industrial burners. Preheating is usually required for handling and proper atomization.

NOTE 1—For information on the significance of the terminology and test methods used in this specification, see Appendix X1.

NOTE 2—A more detailed description of the grades of fuel oils is given in X1.3.

1.2 This specification is for the use of purchasing agencies in formulating specifications to be included in contracts for purchases of fuel oils and for the guidance of consumers of fuel oils in the selection of the grades most suitable for their needs.

1.3 Nothing in this specification shall preclude observance of federal, state, or local regulations which can be more restrictive.

1.4 All values are stated in SI units and are regarded as standard.

NOTE 3—The generation and dissipation of static electricity can create problems in the handling of distillate burner fuel oils. For more information on the subject, see Guide D 4865.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- D 56 Test Method for Flash Point by Tag Closed Tester<sup>2</sup>
- D 86 Test Method for Distillation of Petroleum Products<sup>2</sup>

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.E on Burner, Diesel, Non-aviation Gas Turbine, and Marine Fuels.

Current edition approved Apr. 10, 1998. Published September 1998. Originally published as D 396 – 34 T. Last previous edition D 396 – 96.

<sup>2</sup> Annual Book of ASTM Standards, Vol 05.01.

D 93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester<sup>2</sup>

D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation<sup>2</sup>

D 97 Test Method for Pour Point of Petroleum Oils<sup>2</sup>

D 129 Test Method for Sulfur in Petroleum Products (General Bomb Method)<sup>2</sup>

D 130 Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test<sup>2</sup>

D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)<sup>2</sup>

D 473 Test Method for Sediment in Crude Oils and Fuel Oils by the Extraction Method<sup>2</sup>

D 482 Test Method for Ash from Petroleum Products<sup>2</sup>

D 524 Test Method for Ramsbottom Carbon Residue of Petroleum Products<sup>2</sup>

D 1266 Test Method for Sulfur in Petroleum Products (Lamp Method)<sup>2</sup>

D 1298 Practice for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method<sup>2</sup>

D 1552 Test Method for Sulfur in Petroleum Products (High-Temperature Method)<sup>2</sup>

D 2622 Test Method for Sulfur in Petroleum Products by X-Ray Spectrometry<sup>3</sup>

D 2709 Test Method for Water and Sediment in Distillate Fuels by Centrifuge<sup>3</sup>

D 3245 Test Method for Pumpability of Industrial Fuel Oils<sup>3</sup>

D 3828 Test Methods for Flash Point by Small Scale Closed Tester<sup>3</sup>

D 4052 Test Method for Density and Relative Density of Liquids by Digital Density Meter<sup>3</sup>

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products<sup>3</sup>

D 4294 Test Method for Sulfur in Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry<sup>3</sup>

D 4865 Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems<sup>4</sup>

D 5949 Test Method for Pour Point of Petroleum Products

<sup>3</sup> Annual Book of ASTM Standards, Vol 05.02.

<sup>4</sup> Annual Book of ASTM Standards, Vol 05.03.

(Automatic Pressure Pulsing Method)<sup>4</sup>

D 5950 Test Method for Pour Point of Petroleum Products  
 (Automatic Tilt Method)<sup>4</sup>

D 5985 Test Method for Pour Point of Petroleum Products  
 (Rotational Method)<sup>4</sup>

2.2 Other Documents:<sup>5</sup>

26 CFR Part 48 Diesel Fuel Excise Tax; Dye Color and  
 Concentration

40 Part 80 Regulation of Fuel and Fuel Additives

### 3. General Requirements

3.1 The grades of fuel oil specified herein shall be homogeneous hydrocarbon oils, free from inorganic acid, and free from excessive amounts of solid or fibrous foreign matter.

3.2 All grades containing residual components shall remain uniform in normal storage and not separate by gravity into light and heavy oil components outside the viscosity limits for the grade.

### 4. Detailed Requirements

4.1 The various grades of fuel oil shall conform to the

<sup>5</sup> Available from Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

limiting requirements shown in Table 1. A representative sample shall be taken for testing in accordance with Practice D 4057.

4.2 Modifications of limiting requirements to meet special operating conditions agreed upon between the purchaser, the seller, and the supplier shall fall within limits specified for each grade, except as stated in supplementary footnotes for Table 1.

### 5. Test Methods

5.1 The requirements enumerated in this specification shall be determined in accordance with the following ASTM test methods,<sup>6</sup> except as may be required under 5.1.1.

5.1.1 *Flash Point*—Test Method D 93, except where other methods are prescribed by law. For all grades, Test Method D 3828 may be used as an alternate with the same limits. For Grades No. 1 and No. 2, Test Method D 56 may be used as an alternate with the same limits, provided the flash point is below

<sup>6</sup> For information on the precision of the ASTM test methods for fuel oils refer to "An Evaluation of Methods for Determination of Sulfur in Fuel Oils" by A. R. Crawford, Esso Mathematics & Systems Inc. and G. V. Dyroff, Esso Research and Engineering Co., 1969. This document is available from the Publications Section, API Library American Petroleum Institute, 1220 L St., N.W., Washington, DC 20005.

TABLE 1 Detailed Requirements for Fuel Oils<sup>A</sup>

| Property   | ASTM Test Method <sup>B</sup> | No. 1 <sup>C</sup> | No. 2 <sup>C</sup> | Grade No. 4 (Light) <sup>C</sup> | No. 4               | No. 5 (Light)       | No. 5 (Heavy)       | No. 6               |
|--|-------------------------------|--------------------|--------------------|----------------------------------|---------------------|---------------------|---------------------|---------------------|
| Flash Point °C, min  | D 93                          | 38                 | 38                 | 38                               | 55                  | 55                  | 55                  | 60                  |
| Water and sediment, % vol, max                                     | D 2709                        | 0.05               | 0.05               | ...                              | ...                 | ...                 | ...                 | ...                 |
|  | D 95 + D 473                  | ...                | ...                | (0.50) <sup>D</sup>              | (0.50) <sup>D</sup> | (1.00) <sup>D</sup> | (1.00) <sup>D</sup> | (2.00) <sup>D</sup> |
| Distillation temperature °C  | D 86                          |                    |                    |                                  |                     |                     |                     |                     |
| 10 % volume recovered, max   |                               | 215                | ...                | ...                              | ...                 | ...                 | ...                 | ...                 |
| 90 % volume recovered, min   |                               | ...                | 282                | ...                              | ...                 | ...                 | ...                 | ...                 |
| max  |                               | 288                | 338                | ...                              | ...                 | ...                 | ...                 | ...                 |
| Kinematic viscosity at 40°C, mm <sup>2</sup> /s                    | D 445                         |                    |                    |                                  |                     |                     |                     |                     |
| min  |                               | 1.3                | 1.9                | 1.9                              | >5.5                | ...                 | ...                 | ...                 |
| max  |                               | 2.1                | 3.4                | 5.5                              | 24.0 <sup>E</sup>   | ...                 | ...                 | ...                 |
| Kinematic viscosity at 100°C, mm <sup>2</sup> /s                   | D 445                         |                    |                    |                                  |                     |                     |                     |                     |
| min  |                               | ...                | ...                | ...                              | ...                 | 5.0                 | 9.0                 | 15.0                |
| max  |                               | ...                | ...                | ...                              | ...                 | 8.9 <sup>E</sup>    | 14.9 <sup>E</sup>   | 50.0 <sup>E</sup>   |
| Ramsbottom carbon residue on 10 % distillation residue % mass, max | D 524                         | 0.15               | 0.35               | ...                              | ...                 | ...                 | ...                 | ...                 |
| Ash, % mass, max   | D 482                         | ...                | ...                | 0.05                             | 0.10                | 0.15                | 0.15                | ...                 |
| Sulfur, % mass max <sup>F</sup>                                    | D 129                         | 0.50               | 0.50               | ...                              | ...                 | ...                 | ...                 | ...                 |
| Copper strip corrosion rating, max, 3 h at 50°C                    | D 130                         | No. 3              | No. 3              | ...                              | ...                 | ...                 | ...                 | ...                 |
| Density at 15°C, kg/m <sup>3</sup>                                 | D 1298                        |                    |                    |                                  |                     |                     |                     |                     |
| min  |                               | ...                | ...                | >876 <sup>G</sup>                | ...                 | ...                 | ...                 | ...                 |
| max  |                               | 850                | 876                | ...                              | ...                 | ...                 | ...                 | ...                 |
| Pour Point °C, max <sup>H</sup>                                    | D 97                          | -18                | -6                 | -6                               | -6                  | ...                 | ...                 | ...                 |

<sup>A</sup>It is the intent of these classifications that failure to meet any requirement of a given grade does not automatically place an oil in the next lower grade unless in fact it meets all requirements of the lower grade. However, to meet special operating conditions modifications of individual limiting requirements may be agreed upon among the purchaser, seller and manufacturer.

<sup>B</sup>The test methods indicated are the approved referee methods. Other acceptable methods are indicated in Section 2 and 5.1.

<sup>C</sup>Under United States regulations, Grades No. 1, No. 2, and No. 4 (Light) are required by 40 CFR Part 80 to contain a sufficient amount of the dye Solvent Red 164 so its presence is visually apparent. At or beyond terminal storage tanks, they are required by 26 CFR Part 48 to contain the dye Solvent Red 164 at a concentration spectrally equivalent to 3.9 lbs per thousand barrels of the solid dye standard Solvent Red 26.

<sup>D</sup>The amount of water by distillation by Test Method D 95 plus the sediment by extraction by Test Method D 473 shall not exceed the value shown in the table. For Grade No. 6 fuel oil, the amount of sediment by extraction shall not exceed 0.50 mass %, and a deduction in quantity shall be made for all water and sediment in excess of 1.0 mass %.

<sup>E</sup>Where low sulfur fuel oil is required, fuel oil falling in the viscosity range of a lower numbered grade down to and including No. 4 can be supplied by agreement between the purchaser and supplier. The viscosity range of the initial shipment shall be identified and advance notice shall be required when changing from one viscosity range to another. This notice shall be in sufficient time to permit the user to make the necessary adjustments.

<sup>F</sup>Other sulfur limits may apply in selected areas in the United States and in other countries.

<sup>G</sup>This limit assures a minimum heating value and also prevents misrepresentation and misapplication of this product as Grade No. 2.

<sup>H</sup>Lower or higher pour points can be specified whenever required by conditions of storage or use. When a pour point less than -18°C is specified, the minimum viscosity at 40°C for grade No. 2 shall be 1.7 mm<sup>2</sup>/s and the minimum 90 % recovered temperature shall be waived.

<sup>I</sup>Where low sulfur fuel oil is required, Grade No. 6 fuel oil will be classified as Low Pour (+15°C max) or High Pour (no max). Low Pour fuel oil should be used unless tanks and lines are heated.

93°C and the viscosity is below 5.5 mm<sup>2</sup>/s at 40°C. This test method will give slightly lower values. In cases of dispute, Test Method D 93 shall be used as the referee method.

5.1.2 *Pour Point*—Test Method D 97. For all grades, the automatic Test Methods D 5949, D 5950, and D 5985 can be used as alternates with the same limits. In case of dispute, Test Method 97 shall be used as the referee method. Alternative test methods that indicate flow point properties can be used for low sulfur residual fuels by agreement between purchaser and supplier.

5.1.3 *Water and Sediment*—The water and sediment in Grade Nos. 1 and 2 shall be determined in accordance with Test Method D 2709 and in Grade Nos. 4, 5, and 6 by Test Method D 95 and Test Method D 473. A density of 1.0 kg/L shall be used for the Test Method D 95 water.

5.1.4 *Carbon Residue*—Test Method D 524.

5.1.5 *Ash*—Test Method D 482.

5.1.6 *Distillation*—Distillation of Grade No. 1 and No. 2

oils shall be determined in accordance with Test Method D 86.

5.1.7 *Viscosity*—Viscosity shall be determined in accordance with Test Method D 445.

5.1.8 *Density*—Practice D 1298. Test Method D 4052 can be used as an alternate with the same limits. In case of dispute, Practice D 1298 shall be used as the referee method.

5.1.9 *Corrosion*—Test Method D 130, 3 h test at 50°C.

5.1.10 *Sulfur*—Test Method D 129. Test Methods D 1552, D 2622, and D 4294 can also be used for all grades. In addition, Test Method D 1266 can be used for Grade 1, but only with samples having sulfur contents of 0.4 mass per cent and less (down to 0.01 %). In case of dispute, Test Method D 129 is the referee test method for this specification.

## 6. Keywords

6.1 burner fuels; fuel oils; furnace oils; petroleum and petroleum products; specifications

## APPENDIX

### (Nonmandatory Information)

#### X1. SIGNIFICANCE OF ASTM SPECIFICATION FOR FUEL OILS

##### X1.1 Scope

X1.1.1 This specification divides fuel oils into grades based upon the types of burners for which they are suitable. It places limiting values on several of the properties of the oils in each grade. The properties selected for limitation are those that are believed to be of the greatest significance in determining the performance characteristics of the oils in the types of burners in which they are most commonly used.

##### X1.2 Classes

X1.2.1 Because of the methods employed in their production, fuel oils fall into two broad classifications: distillates and residuals. The distillates consist of overhead or distilled fractions. The residuals are bottoms remaining from the distillation, or blends of these bottoms with distillates. In this specification, Grades No. 1 and No. 2 are distillates and the grades from No. 4 to No. 6 are usually residual, although some heavy distillates can be sold as Grade No. 4.

##### X1.3 Grades

X1.3.1 *Grade No. 1* is a light distillate intended for use in burners of the vaporizing type in which the oil is converted to a vapor by contact with a heated surface or by radiation. High volatility is necessary to ensure that evaporation proceeds with a minimum of residue.

X1.3.2 *Grade No. 2* is a heavier distillate than grade No. 1. It is intended for use in atomizing type burners which spray the oil into a combustion chamber where the tiny droplets burn while in suspension. This grade of oil is used in most domestic burners and in many medium capacity commercial-industrial burners where its ease of handling and ready availability sometimes justify its higher cost over the residual fuels.

X1.3.3 *Grade No. 4 (Light)* is a heavy distillate fuel or distillate/residual fuel blend meeting the specification viscosity range. It is intended for use both in pressure-atomizing commercial-industrial burners not requiring higher cost distillates and in burners equipped to atomize oils of higher viscosity. Its permissible viscosity range allows it to be pumped and atomized at relatively low-storage temperatures.

X1.3.4 *Grade No. 4* is usually a heavy distillate/residual fuel blend but can be a heavy distillate fuel meeting the specification viscosity range. It is intended for use in burners equipped with devices that atomize oils of higher viscosity than domestic burners can handle. Its permissible viscosity range allows it to be pumped and atomized at relatively low storage temperatures. Thus, in all but extremely cold weather it requires no preheating for handling.

X1.3.5 *Grade No. 5 (Light)* is residual fuel of intermediate viscosity for burners capable of handling fuel more viscous than grade No. 4 without preheating. Preheating may be necessary in some types of equipment for burning and in colder climates for handling.

X1.3.6 *Grade No. 5 (Heavy)* is a residual fuel more viscous than Grade No. 5 (Light) and is intended for use in similar service. Preheating may be necessary in some types of equipment for burning and in colder climates for handling.

X1.3.7 *Grade No. 6*, sometimes referred to as Bunker C, is a high-viscosity oil used mostly in commercial and industrial heating. It requires preheating in the storage tank to permit pumping, and additional preheating at the burner to permit atomizing. The extra equipment and maintenance required to handle this fuel usually preclude its use in small installations.

X1.3.8 Residual fuel oil supplied to meet regulations requiring low sulfur content can differ from the grade previously

supplied. It may be lower in viscosity (and fall into a different grade number). If it must be fluid at a given temperature, Test Method D 97 need not accurately reflect the pour point which can be expected after a period of storage. It is suggested that the purchaser and supplier discuss the proper handling and operating techniques for a given low-sulfur residual fuel oil in the installation where it is to be used.

#### **X1.4 Significance of Test Methods**

X1.4.1 The significance of the properties of fuel oil on which limitations are placed by the specification is as follows:

X1.4.1.1 *Flash Point*—The flash point of a fuel oil is an indication of the maximum temperature at which it can be stored and handled without serious fire hazard. The minimum permissible flash point is usually regulated by federal, state, or municipal laws and is based on accepted practice in handling and use.

X1.4.1.2 *Pour Point*—The pour point is an indication of the lowest temperature at which a fuel oil can be stored and still be capable of flowing under very low forces. The pour point is prescribed in accordance with the conditions of storage and use. Higher pour point fuels are permissible where heated storage and adequate piping facilities are provided. An increase in pour point can occur when residual fuel oils are subjected to cyclic temperature variations that can occur in the course of storage or when the fuel is preheated and returned to storage tanks. To predict these properties, Test Method D 3245 may be required.

X1.4.1.3 *Water and Sediment*—Appreciable amounts of water and sediment in a fuel oil tend to cause fouling of facilities for handling it, and to give trouble in burner mechanisms. Sediment may accumulate in storage tanks and on filter screens or burner parts, resulting in obstruction to flow of oil from the tank to the burner. Water in distillate fuels can cause corrosion of tanks and equipment and it can cause emulsions in residual fuels.

X1.4.1.4 *Carbon Residue*—The carbon residue of a fuel is a measure of the carbonaceous material left after all the volatile components are vaporized in the absence of air. It is a rough approximation of the tendency of a fuel to form deposits in vaporizing burners, such as pot-type and sleeve-type burners, where the fuel is vaporized in an air-deficient atmosphere.

X1.4.1.4.1 To obtain measurable values of carbon residue in the lighter distillate fuel oils, it is necessary to distill the oil to remove 90 % of it in accordance with Section 9 of Test Method D 524, and then determine the carbon residue concentrated in the remaining 10 % bottoms.

X1.4.1.5 *Ash*—The amount of ash is the quantity of non-combustible material in an oil. Excessive amounts can indicate the presence of materials that cause high wear of burner pumps and valves, and contribute to deposits on boiler heating surfaces.

X1.4.1.6 *Distillation*—The distillation test shows the vola-

tility of a fuel and the ease with which it can be vaporized. The test is of greater significance for oils that are to be burned in vaporizing type burners than for the atomizing type. For example, the maximum 10 % and 90 % distilled temperatures are specified for grade No. 1 fuel. The limiting 10 % value assures easy starting in vaporizing type burners and the 90 % limit excludes heavier fractions that would be difficult to vaporize.

X1.4.1.6.1 The limits specified for grade No. 2 heating oil define a product that is acceptable for burners of the atomizing type in household heating installations. Distillation limits are not specified for fuel oils of grades Nos. 4, 5, and 6.

X1.4.1.7 *Viscosity Limits for Grades Nos. 1 and 2*—The viscosity of an oil is a measure of its resistance to flow. In fuel oil it is highly significant since it indicates both the relative ease with which the oil will flow or can be pumped, and the ease of atomization.

X1.4.1.7.1 Viscosity limits for No. 1 and No. 2 grades are specified to help maintain uniform fuel flow in appliances with gravity flow, and to provide satisfactory atomization and constant flow rate through the small nozzles of household burners. For the heavier grades of industrial and bunker fuel oils, viscosity is of major importance, so that adequate pre-heating facilities can be provided to permit them to be pumped to the burner and to provide good atomization. However, it is equally important that the maximum viscosity under the existing conditions be such that the oil can be pumped satisfactorily from the storage tank to the preheater.

X1.4.1.8 *Density*—Density alone is of little significance as an indication of the burning characteristics of fuel oil. However, when used in conjunction with other properties, it is of value in mass-volume relationships and in calculating the specific energy (heating value) of an oil.

X1.4.1.9 *Corrosion*—The corrosion test serves to indicate the presence or absence of materials that could corrode copper, brass, and bronze components of the fuel system. This property is specified only for Nos. 1 and 2 distillate fuel oils.

X1.4.1.10 Limited sulfur content of fuel oil can be required for special uses in connection with heat treatment, nonferrous metal, glass, and ceramic furnaces or to meet federal, state, or local legislation or regulations.

X1.4.1.11 *Nitrogen*—Nitrogen oxide emission regulations have been imposed on certain combustion facilities as a function of fuel nitrogen content. For purposes of these regulations, distillate fuels, low nitrogen residual fuels, and high nitrogen residual fuels have been defined by their nitrogen content. Installations are required to meet different emission standards according to the classification of the fuel being used. When regulations require such a distinction to be made, fuel nitrogen specifications can be needed in the contractual agreement between the purchaser and the supplier.

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# EXHIBIT 9



# Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer<sup>1</sup>

This standard is issued under the fixed designation D 1217; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This test method covers the measurement of the density of pure hydrocarbons or petroleum distillates boiling between 90 and 110°C that can be handled in a normal fashion as a liquid at the specified test temperatures of 20 and 25°C.

1.2 This test method provides a calculation procedure for conversion of density to relative density (specific gravity).

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Note 1, Note 2, and Note 3.

## 2. Referenced Documents

2.1 *ASTM Standards:*

E 1 Specification for ASTM Thermometers<sup>2</sup>

## 3. Terminology

3.1 *Definitions:*

3.1.1 *density*—the weight in vacuo, (that is, the mass) of a unit volume of the material at any given temperature.

3.1.2 *relative density (specific gravity)*—the ratio of the mass (weight in vacuo) of a given volume of material at a temperature,  $t_1$ , to the mass of an equal volume of water at a reference temperature,  $t_2$ ; or it is the ratio of the density of the material at  $t_1$  to the density of water at  $t_2$ . When the reference temperature is 4.00°C, the temperature at which the relative density of water is unity, relative density (specific gravity) and density are numerically equal.

## 4. Summary of Test Method

4.1 The liquid sample is introduced into a pycnometer, equilibrated to the desired temperature, and weighed. The relative density (specific gravity) or density is then calculated

from this weight and the previously determined weight of water that is required to fill the pycnometer at the same temperature, both weights being corrected for the buoyancy of air.

## 5. Significance and Use

5.1 Density is a fundamental physical property which can be used in conjunction with other properties to characterize pure hydrocarbons and their mixtures.

5.2 This test method was originally developed for the determination of the density of the ASTM Knock Test Reference Fuels *n*-heptane and isooctane, with an accuracy of 0.00003 g/mL. Although it is no longer employed extensively for this purpose, this test method is useful whenever accurate densities of pure hydrocarbons or petroleum fractions with boiling points between 90 and 110°C are required.

## 6. Apparatus

6.1 *Pycnometer*, Bingham-type,<sup>3</sup> conforming to the dimensions given in Fig. 1, constructed of borosilicate glass and having a total weight not exceeding 30 g.

6.2 *Constant-Temperature Bath*, provided with suitable pycnometer holders or clips and means for maintaining temperatures constant to  $\pm 0.01^\circ\text{C}$  in the desired range.

6.3 *Bath Thermometer*, graduated in  $0.1^\circ\text{C}$  subdivisions and standardized for the ice point and the range of use to the nearest  $0.01^\circ\text{C}$ . ASTM Saybolt Viscosity Thermometer 17C as prescribed in Specification E 1, designed for tests at  $21.1^\circ\text{C}$  and  $25^\circ\text{C}$ , is recommended. A standardized platinum resistance thermometer may also be used, and offers the best means for observing minute temperature changes in the bath. Whichever means are available, it must be realized that for most hydrocarbons the density coefficient is about  $0.0008 \text{ units}/^\circ\text{C}$ , and therefore an error of  $\pm 0.013^\circ\text{C}$  would cause an error of  $\pm 0.00001$  in density.

6.4 *Hypodermic Syringe*, 30-mL capacity, of chemically resistant glass, equipped with a 152-mm (6-in.) needle made of stainless steel tubing as shown in Fig. 2.

6.5 *Draw-Off Needle*, made of stainless steel tubing as shown in Fig. 2.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04 on Hydrocarbon Analysis.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 14.03.

<sup>3</sup> Pycnometer available from Reliance Glass Co., 220 Gateway Rd., Bensenville, IL 60106-0825, has been found satisfactory.

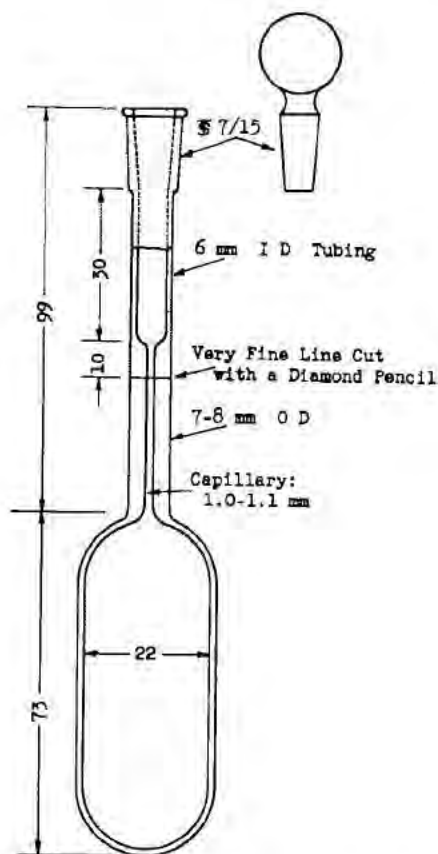


FIG. 1 Bingham-Type Pycnometer, 25 mL

6.6 Solvent-Cleaning Assembly, as shown in Fig. 3.

6.7 Chromic Acid Cleaning Apparatus, similar to that shown in Fig. 4.

6.8 Balance, capable of reproducing weighings within 0.1 mg. Mechanical balances should have sensitivity which causes the pointer to be deflected 2 or 3 scale divisions per 1 mg when carrying a load of 30 g or less on each pan. The balance should be located in a room shielded from drafts and fumes and in which the temperature changes between related weighings (empty and filled pycnometer) do not cause a significant change in the ratio of the balance arms. Otherwise weighings shall be made by the method of substitution, in which the calibrated weights and pycnometer are alternately weighed on the same balance pan. The same balance shall be used for all related weighings.

6.9 Weights, whose relative values are known to the nearest 0.05 mg or better. The same set of weights shall be used for the calibration of the pycnometer and the determination of densities.

## 7. Reagents and Materials

7.1 Acetone—(Warning—See Note 1).

NOTE 1—Warning: Extremely flammable. Use adequate ventilation.

7.2 Isopentane—(Warning—See Note 2).

NOTE 2—Warning: Extremely flammable. Avoid buildup of vapors and remove all sources of ignition, especially non-explosion proof electrical apparatus.

7.3 Chromic Acid (Potassium Dichromate/Conc. Sulfuric Acid)—(Warning—See Note 3).

NOTE 3—Warning: Causes severe burns. A recognized carcinogen. Do not get in eyes, or on skin or clothing.

## 8. Preparation of Apparatus

8.1 Thoroughly clean the pycnometer with hot chromic acid cleaning solution by means of the assembly shown in Fig. 4 (Warning—See Note 3). Chromic acid solution is the most effective cleaning agent. However, surfactant cleaning fluids have also been used successfully. Mount the apparatus firmly and connect the trap to the vacuum. Warm the necessary amount of cleaning acid in the beaker, place the pycnometer on the ground joint, and evacuate by opening the stopcock to vacuum. Fill the pycnometer with acid by turning the stopcock, repeat several times or remove the filled pycnometer, and allow it to stand for several hours at 50 to 60°C. Remove the acid from the pycnometer by evacuation, empty the acid from the trap, and flush the pycnometer with water. Cleaning should be made in this manner whenever the pycnometer is to be calibrated or whenever liquid fails to drain cleanly from the walls of the pycnometer or its capillary. Ordinarily, the pycnometer may be cleaned between determinations by washing with a suitable solvent, rinsing with pure, dry acetone, followed by isopentane, and vacuum drying.

8.2 Transfer the pycnometer to the cleaner assembly shown in Fig. 3, with vacuum line and trap attached to the side tube as indicated. Place the pycnometer on the cleaner with the upper hypodermic needle extending upward into the pycnometer, and press the edge of the ground joint on the rubber stopper until the vacuum holds it in place. Draw out all the liquid or sample. Immerse the lower end of the hypodermic tube in a suitable solvent and draw 20 to 25 mL through the pycnometer. Leaving the pycnometer in place, draw air through it until it is dry. Clean the hypodermic syringe with the same apparatus.

## 9. Calibration of Pycnometer

9.1 Proceeding as directed in Section 10, determine the weight of freshly-boiled and cooled distilled water (distilled from alkaline permanganate through a tin condenser) held by the pycnometer when equilibrated to volume at the bath temperature to be used in the determination. Repeat until at least three values agree to  $\pm 0.2$  mg.

## 10. Procedure

10.1 Using another 25-mL pycnometer as a tare (Note 4), weigh the clean, dry pycnometer to 0.1 mg and record the weight.

NOTE 4—It is convenient to use the lightest of a set of pycnometers as a tare. For best results the treatment and environment of both pycnometer and tare should be identical for some time prior to weighing.

10.2 Cool the sample to 5 to 10°C below the test temperature, and fill the clean 30-mL hypodermic syringe. Transfer the sample to the pycnometer through the filling needle; avoid trapping air bubbles (Note 2) in the bulb or capillary of the pycnometer. If any are present, draw them into the syringe where possible. Also remove with the syringe or draw-off

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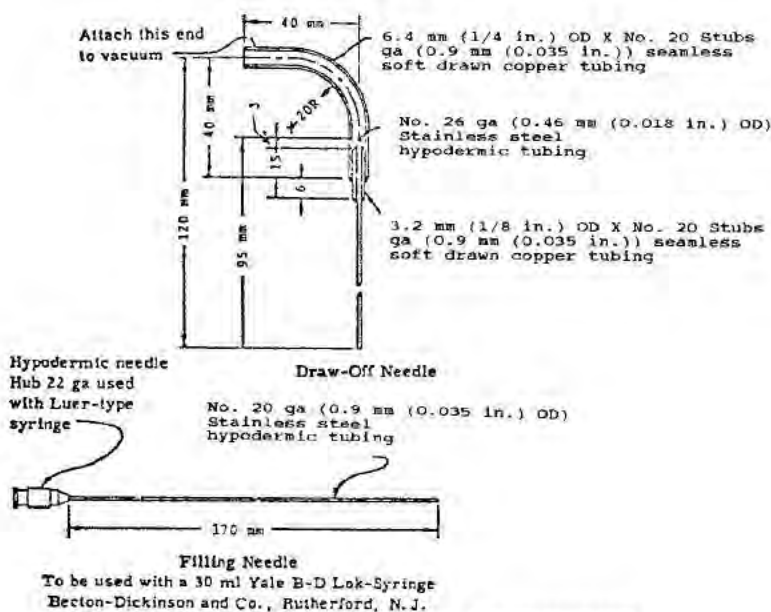


FIG. 2 Accessories for Bingham-Type Pycnometer

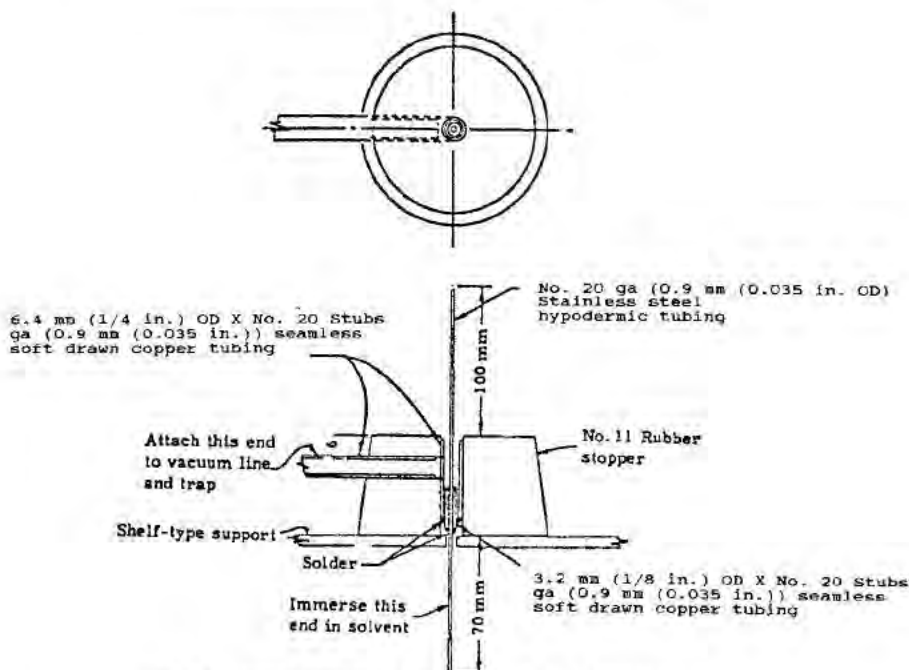


FIG. 3 Cleaner Assembly for Bingham-Type Pycnometer

needle any liquid above the calibration mark in the capillary or overflow reservoir. Dry the remainder with a cotton fiber pipe cleaner or cotton swab which has been dampened slightly with acetone.

NOTE 5—For work of highest accuracy on pure compounds, dissolved air may be removed from the sample by repeated freezing and remelting of the sample under vacuum in the pycnometer.

10.3 Close the pycnometer with the glass stopper and immerse it to a point above the calibration mark in the constant-temperature bath adjusted to a constancy of  $\pm 0.01^\circ\text{C}$

at the desired temperature. Periodically, or before the liquid expands into the overflow chamber, remove the stopper, raise the pycnometer sufficiently to expose the calibration mark to view, and readjust the liquid level to the mark by withdrawing liquid through the steel draw-off needle until expansion has stopped, indicating that the liquid has reached the temperature of the thermostat. Do not allow the liquid to expand more than 10 mm above the calibration mark at any time, to minimize errors caused by faulty drainage. Allow the contents to equilibrate an additional 10 min and draw the level down exactly to

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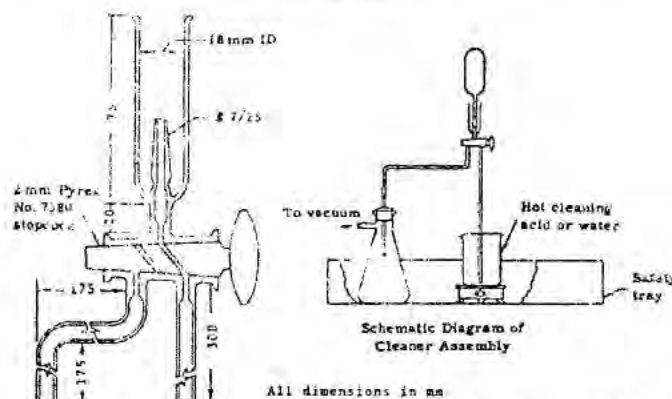


FIG. 4 All-Glass Pycnometer Cleaner Assembly for Use with Hot Chromic Acid Cleaning Solution

the calibration line, avoiding parallax and using a magnifier, if necessary, to obtain good visibility. Remove any liquid adhering to the walls above the calibration mark, with the draw-off needle or pipe cleaner, depending upon the volatility of the sample. Portions in the overflow bulb may be removed with a cotton swab moistened with acetone.

10.4 Replace the glass stopper, remove the pycnometer from the bath, wash the outside surface with acetone, and dry thoroughly with a chemically clean, lint-free, slightly damp cloth. Place the pycnometer in or near the balance case for 20 min and weigh to the nearest 0.1 mg. In atmospheres of low humidity (60 % or lower), drying the pycnometer by rubbing with a dry cotton cloth will induce static charges equivalent to a loss of about 1 mg in the weight of the pycnometer. This charge need not be completely dissipated in less than 30 min. The use of about 0.1-mg radium bromide- or polonium-coated foil in the balance case, or maintaining the relative humidity at 60 % or higher, aids in reducing weighing difficulties due to static charges.

10.5 Record temperature of the balance, barometric pressure, and relative humidity.

## 11. Calculation

11.1 Calculate the true density of the sample as follows:

$$\text{Density, g/mL at } ^\circ\text{C} = W_s(1 + (d_a/d_s) - (d_a/d_{wt})) / W_w(1 + (d_a/d_w) - (d_a/d_{wt})) \quad (1)$$

where:

- $W_s$  = weight in air of sample contained in the pycnometer at the test temperature, g,
- $W_w$  = weight in air of the water contained in the pycnometer at the calibration temperature, g,
- $d_w$  = density of water at the calibration temperature, as obtained from Table 1,
- $d_a$  = density of air in balance case at the time of weighing, as calculated from 10.3,
- $d_{wt}$  = density of weights used in weighing the sample and water (brass = 10.4 g/mL, stainless steel = 7.75 g/mL), and
- $d_s$  = approximate density of sample or

$$(W_s \times d) / W_w \quad (2)$$

TABLE 1 Density of Water<sup>A</sup>

| Temperature, °C | Density, g/mL | Temperature, °C | Density, g/mL | Temperature, °C | Density, g/mL |
|-----------------|---------------|-----------------|---------------|-----------------|---------------|
| 0               | 0.999840      | 21              | 0.997991      | 40              | 0.992212      |
| 3               | 0.999964      | 22              | 0.997769      | 45              | 0.990208      |
| 4               | 0.999972      | 23              | 0.997537      | 50              | 0.988030      |
| 5               | 0.999964      | 24              | 0.997295      | 55              | 0.985688      |
| 10              | 0.999699      | 25              | 0.997043      | 60              | 0.983191      |
| 15              | 0.999099      | 26              | 0.996782      | 65              | 0.980546      |
| 15.56           | 0.999012      | 27              | 0.996511      | 70              | 0.977759      |
| 16              | 0.998943      | 28              | 0.996231      | 75              | 0.974837      |
| 17              | 0.998774      | 29              | 0.995943      | 80              | 0.971785      |
| 18              | 0.998595      | 30              | 0.995645      | 85              | 0.968606      |
| 19              | 0.998404      | 35              | 0.994029      | 90              | 0.965305      |
| 20              | 0.998203      | 37.78           | 0.993042      | 100             | 0.958345      |

<sup>A</sup>Densities conforming to the International Temperature Scale 1990 (ITS 90) were extracted from Appendix G, *Standard Methods for Analysis of Petroleum and Related Products 1991*, Institute of Petroleum, London.

11.2 The equation assumes that the weighings of the pycnometer empty and filled are made in such a short time interval that the air density has not changed. If significant change should occur, the calculated apparent weight of the sample,  $W_s$ , in this equation, must be corrected for the difference in air buoyancy exerted on the pycnometer as follows:

$$W_s = W_{PS}^2 - W_P'(1 + (d_a'/2.2) - (d_a'/d_{wt})) / (1 + (d_a^2/2.2) - (d_a^2/d_{wt})) \quad (3)$$

where:

- $W_{PS}^2$  = weight of pycnometer and contained sample under second or final air density,
- $W_P'$  = weight of pycnometer in air of first density,
- $d_a'$  = density of air when weighing empty pycnometer,
- $d_a^2$  = density of air when weighing filled pycnometer, and
- $d_{wt}$  and 2.2 = density of weights and borosilicate glass, respectively.

Likewise, if the pycnometer, empty and filled with water for calibration, is weighed under different air densities a similar correction for different air buoyancies shall be applied.

11.3 Calculate the relative density (specific gravity) of the sample by dividing the density as obtained in 11.1 by the relative density of water at the reference temperature obtained from Table 1.

11.4 Calculate the density of air in the balance room as follows:

$$\text{Air density } (d_a), \text{ g/mL} \\ = [(B - 0.3783 \text{ Hp})(0.000465)](273 + t) \quad (4)$$

where:

$B$  = barometric pressure, mm Hg, corrected to 0°C,  
 $H$  = relative humidity, decimal fraction,  
 $p$  = vapor pressure of water at temperature  $t$ , mm Hg, and  
 $t$  = room temperature, °C.

NOTE 6—If this test method is to be used frequently, a considerable amount of calculation can be avoided by use of a gas density balance to determine the air density. Weigh a sealed 250-mL glass bulb at several different air densities and plot the weight against the air density. To determine the air density at some later time, weigh the bulb and read the air density from the point on the curve corresponding to the weight.

11.5 To calculate the density or relative density (specific gravity) at any test temperature,  $t$ , other than the calibration temperature,  $t_c$  (to correct for the cubical coefficient of thermal expansion of borosilicate glass), divide the value obtained in 10.1 or 10.2 by the following expression:

$$1 + 9.6 \times 10^{-6} (t - t_c) \quad (5)$$

## 12. Report

12.1 In reporting density, give the test temperature and the units (for example, density, 20°C = x.xxxxx g/mL). In report-

ing relative density (specific gravity), give both the test temperature and the reference temperature, but no units (for example, relative density (specific gravity), 20/4°C = x.xxxxx). Carry all calculations to one digit beyond the last significant figure, but report the final result to the fifth decimal place (0.00001).

## 13. Precision and Bias

13.1 *Precision*—Results, using the 25-mL Bingham-type pycnometer, should not differ from the mean by more than the following amounts:

| Repeatability<br>One Operator and<br>Apparatus | Reproducibility<br>Different Operators<br>and Apparatus |
|--|---|
| 0.00002  | 0.00003   |

NOTE 7—The precision for this method was not obtained in accordance with RR:D02-1007.

13.2 *Bias*—The difference of results from the established values when compared to pure reference materials is not expected to be more than  $\pm 0.00003$  g/mL. Specific bias has not been established by cooperative testing.

## 14. Keywords

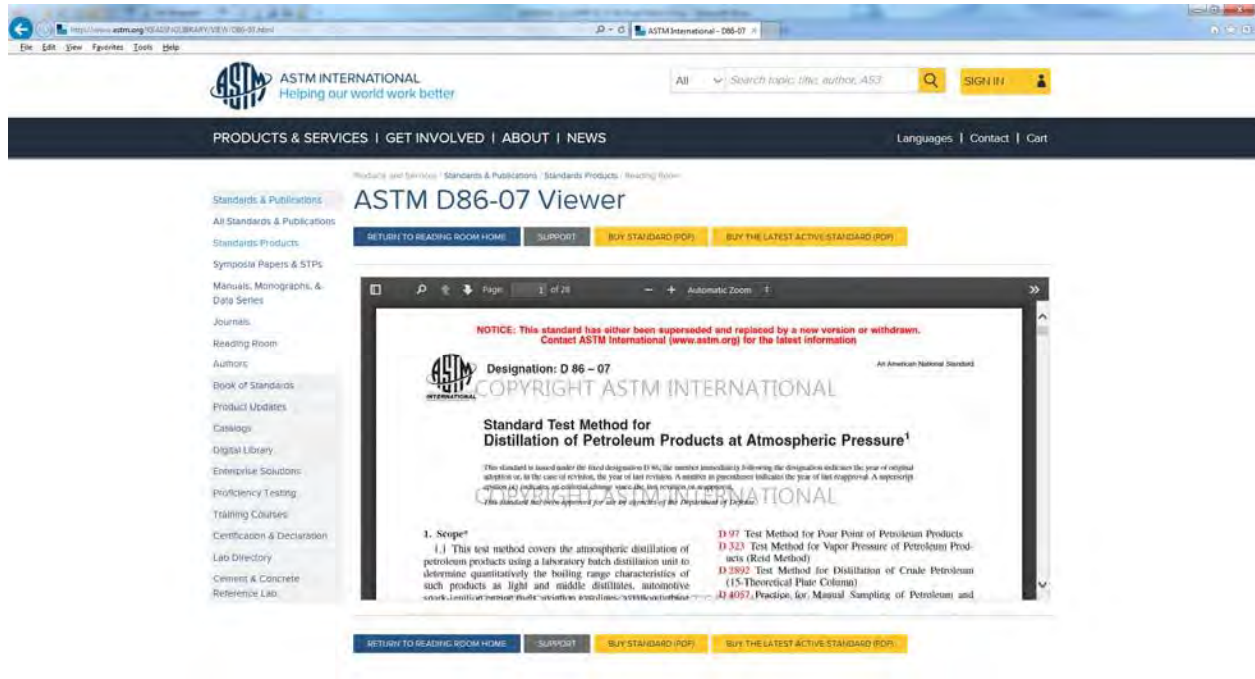
14.1 Density; pycnometer; relative density; specific gravity

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# EXHIBIT 17



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Designation: D 86 – 07

Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure<sup>1</sup>

1. Scope<sup>a</sup>

1.1 This test method covers the atmospheric distillation of petroleum products using a laboratory batch distillation unit to determine quantitatively the boiling range characteristics of such products as light and middle distillates, automotive

1.97 Test Method for Pour Point of Petroleum Products

1.323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)

D 3802 Test Method for Distillation of Crude Petroleum (15-Theoretical Plate Column)

D 4057 Practice for Manual Sampling of Petroleum and

The screenshot shows the ASTM International website interface. At the top, the ASTM logo and tagline "ASTM INTERNATIONAL Helping our world work better" are visible. A search bar and a "SIGN IN" button are located in the top right. Below the header, a navigation bar contains links for "PRODUCTS & SERVICES", "GET INVOLVED", "ABOUT", and "NEWS". On the left side, a sidebar lists various categories such as "Standards & Publications", "All Standards & Publications", "Standards Products", "Symposia Papers & STPs", "Manuals, Monographs, & Data Series", "Journals", "Reading Room", "Authors", "Book of Standards", "Product Updates", "Catalogs", "Digital Library", "Enterprise Solutions", "Proficiency Testing", "Training Courses", "Certification & Declaration", "Lab Directory", "Cement & Concrete", and "Reference Lab". The main content area is titled "ASTM D975-07 Viewer". Below the title, there are buttons for "RETURN TO READING ROOM HOME", "SUPPORT", "BUY STANDARD (PDF)", and "BUY THE LATEST ACTIVE STANDARD (PDF)". The viewer displays a document titled "Standard Specification for Diesel Fuel Oils". A prominent red notice at the top of the document states: "NOTICE: This standard has either been superseded and replaced by a new version or withdrawn. Contact ASTM International (www.astm.org) for the latest information." The document also includes the ASTM logo, the designation "D 975 - 07", and the text "COPYRIGHT ASTM INTERNATIONAL". The main body of the document contains the "1. Scope" section, which describes the standard's applicability to various types of diesel engines and lists specific grades of diesel fuel oils.

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The main content area is titled "ASTM D1217-93(98) Viewer". Below this title, there are four buttons: "RETURN TO READING ROOM HOME", "SUPPORT", "BUY STANDARD (PDF)", and "BUY THE LATEST ACTIVE STANDARD (PDF)".

The central viewer window shows the document content. At the top of the document, a notice states: "NOTICE: This standard has either been superseded and replaced by a new version or withdrawn. Contact ASTM International (www.astm.org) for the latest information." Below this, the document title is "Designation: D 1217 - 93 (Reapproved 1998)". The main title of the standard is "Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer".

The document content includes a "Scope" section with two sub-sections: "1.1 This test method covers the measurement of the density of pure hydrocarbons or petroleum distillates boiling between 90 and 110°C that can be handled in a normal fashion as a liquid at the specified test temperatures of 20 and 25°C." and "1.2 This test method provides a calculating procedure for...". A "Significance and Use" section begins with "5.1 Density is a fundamental physical property which can be...".

At the bottom of the viewer window, there are four buttons: "RETURN TO READING ROOM HOME", "SUPPORT", "BUY STANDARD (PDF)", and "BUY THE LATEST ACTIVE STANDARD (PDF)".



# EXHIBIT 18

**⇒ PREAMBLE—NOT PART OF THE SPECIFICATION ⇐**

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- This specification has been incorporated by reference into federal law by the Consumer Product Safety Commission as part of the Safety Standard for Infant Walkers ([16 CFR 1216](#)).
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- Internal IDs have been assigned to each clause and section (e.g., [s3.1](#)), figure ("f1"), table ("t1"), and equation ("eq1").
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**⇒ END OF PREAMBLE—NOT PART OF THE SPECIFICATION ⇐**

Designation: F977 – 12

**Standard Consumer Safety Specification for Infant Walkers<sup>1</sup>**

This standard is issued under the fixed designation F977; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

<sup>1</sup> This consumer safety specification is under the jurisdiction of [ASTM Committee F15](#) on Consumer Products and is the direct responsibility of [Subcommittee F15.17](#) on Carriages, Strollers, Walkers and Stationary Activity Centers.

Current edition approved May 1, 2012. Published May 2012. Originally approved in 1986. Last previous edition approved in 2011 as F977 – 11b. DOI: [10.1520/F0977-12](#).

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## INTRODUCTION

This consumer safety specification addresses walker incidents that were identified by the U.S. Consumer Product Safety Commission (CPSC).

Based on data collected by the CPSC, the majority of incidents involved children falling down stairs or steps in walkers. Other incidents involved children tipping over in walkers or accessing hot surfaces or liquids. The injuries associated with these incidents ranged from cuts and bruises to burns, skull fractures, and deaths. Most of the children injured were under 15 months old.

In response to the incident data provided by the CPSC, this consumer safety specification attempts to minimize the risk of injury or death associated with children in walkers falling down stairs or between levels, or tipping over. It also contains provisions to address the risk of injury associated with walker seating systems and folding mechanisms.

### 1. Scope

**1.1** This consumer safety specification covers performance requirements, test methods, and marking requirements to promote safe use of the infant walker (see [3.1](#)).

**1.2** This consumer safety specification is intended to minimize accidents to children resulting from normal use and reasonably foreseeable misuse or abuse of walkers.

**1.3** No walker produced after the approval date of this consumer safety specification shall, either by label or other means, indicate compliance with this specification unless it conforms to all requirements contained herein.

**1.4** This consumer safety specification is not intended to address accidents and injuries resulting from the interaction of other persons with the child in the walker or the accidents resulting from abuse and misuse by children able to walk.

**1.5** The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

**1.6** The following precautionary caveat pertains only to the test method portion, [Section 7](#), of this consumer safety specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

- D3359 Test Methods for Measuring Adhesion by Tape Test
- [F963](#) Consumer Safety Specification for Toy Safety

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

#### 2.2 Federal Regulations:<sup>3</sup>

- [16 CFR 1303](#) Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint
- [16 CFR 1500](#) Hazardous Substances Act Regulations Including Sections:
  - [1500.48](#) Technical Requirements for Determining a Sharp Point in Toys or Other Articles Intended for Use by Children Under Eight Years of Age
  - [1500.49](#) Technical Requirements for Determining a Sharp Metal or Glass Edge in Toys or Other Articles Intended for Use by Children Under Eight Years of Age
  - [1500.50-.52](#) Test Methods for Simulating Use and Abuse of Toys and Other Articles Intended for Use by Children
- [16 CFR 1501](#) Method for Identifying Toys and Other Articles Intended for Use by Children Under Three Years of Age Which Present Choking, Aspiration, or Ingestion Hazards Because of Small Parts

<sup>3</sup> Available from U.S. Government Printing Office, N. Capital and H Streets, NW, Washington, DC 20401.

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

**3.1.1** *conspicuous, adj*— a label that is visible, when the unit is in a manufacturer's recommended use position, to a person standing near the unit at any one position around the unit but not necessarily visible from all positions.

**3.1.2 dynamic load, *n***— application of impulsive force through free fall of a weight.

**3.1.3 manufacturer's recommended use position, *n***— any position that is presented as a normal, allowable, or acceptable configuration for the use of the product by the manufacturer in any descriptive or instructional literature. This specifically excludes positions that the manufacturer shows in a like manner in its literature to be unacceptable, unsafe, or not recommended.

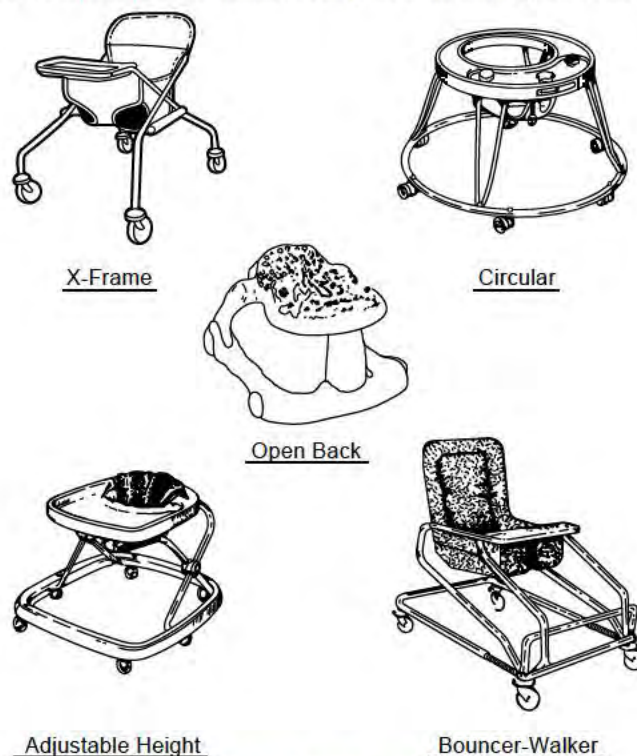
**3.1.4 non-paper label, *n***— any label material (such as plastic or metal) which either will not tear without the aid of tools or tears leaving a sharply defined edge.

**3.1.5 occupant, *n***— that individual who is in a product that is set up in one of the manufacturer's recommended use positions.

**3.1.6 paper label, *n***— any label material which tears without the aid of tools and leaves a fibrous edge.

**3.1.7 static load, *n***— a vertically downward force applied by a calibrated force gauge or by dead weights.

**3.1.8 walker, *n***— a mobile unit that enables a child to move on a horizontal surface when propelled by the child sitting or standing within the walker, and that is in the manufacturer's recommended use position. Examples of different style walkers can be seen in [Fig. 1](#).



**FIG. 1 Illustrations of Five Types of Baby Walkers**

#### **4. Calibration and Standardization**

**4.1** All testing shall be conducted on a concrete floor that may be covered with 1/8 in. (3 mm) thick vinyl floor cover, unless test instructs differently.

**4.2** The walker shall be completely assembled, unless otherwise noted, in accordance with the manufacturer's instructions.

**4.3** No testing shall be conducted within 48 h of manufacturing.

**4.4** The product to be tested shall be in a room with ambient temperature of  $73 \pm 9^\circ\text{F}$  ( $23 \pm 5^\circ\text{C}$ ) for at least 1 h prior to testing. Testing then shall be conducted within this temperature range.

**4.5** All testing required by this specification shall be conducted on the same unit.

**4.6** The following guidelines shall apply to force gauges used for testing:

**4.6.1 Equipment**— Force gauge with a range of 0 to 25 lbf (111 N) and a tolerance of 60.25 lbf (1.1 N). A calibration interval shall be maintained for the force gauge which will ensure that the accuracy does not drift beyond the stated tolerance.

**4.6.2 Equipment**— Force gauge with a range 0 to 100 lbf (445 N) and a tolerance of 61 lbf (4.4 N). A calibration interval shall be maintained for the force gauge which will ensure that the accuracy does not drift beyond the stated tolerance.

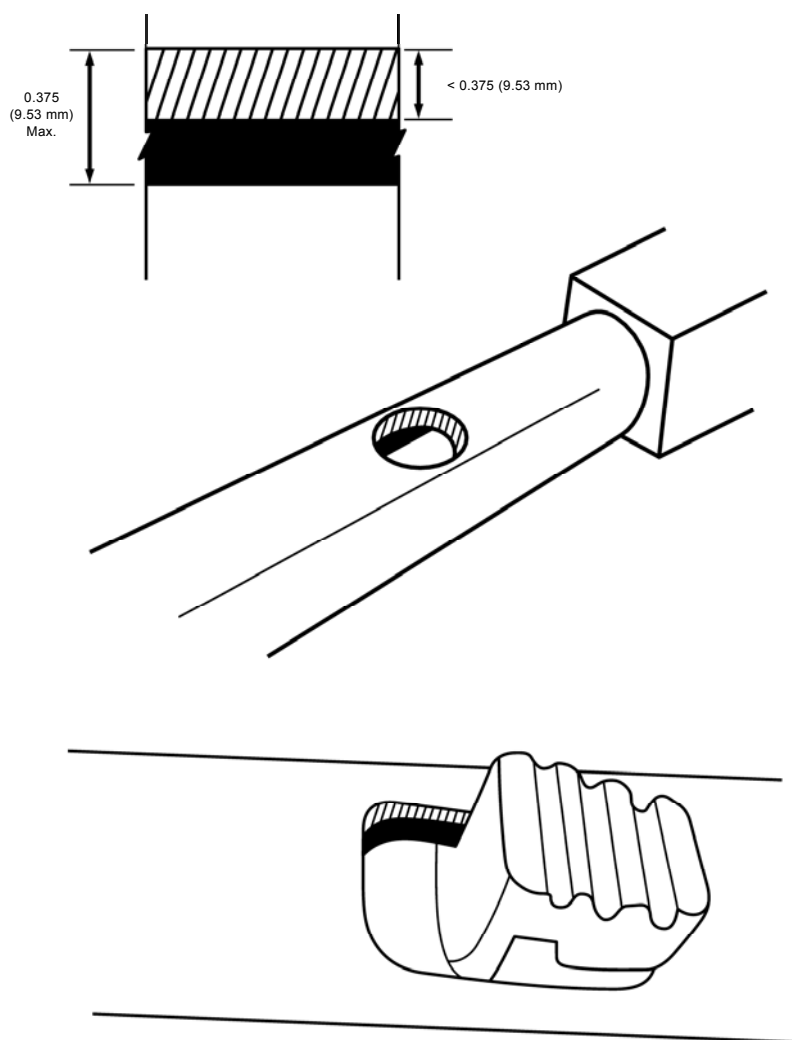
## 5. General Requirements

**5.1** The walker shall conform to the regulations specified in [Section 2](#) of this specification before and after all testing.

**5.2** Prior to testing, any exposed wood parts shall be smooth and free from splinters.

**5.3 Latching or Locking Mechanisms**— Any unit that folds shall have a latching or locking device or other provision in the design that will prevent the unit from unintentionally folding when properly placed in the manufacturer's recommended use position. The unit shall remain in its manufacturer's recommended use position during and upon completion of the test, in accordance with [7.2](#). If a unit is designed with a latching or locking device, that device shall remain engaged and operative after testing.

**5.4 Openings**— Holes or slots that extend entirely through a wall section of any rigid material less than 0.375 in. (9.53 mm) thick and admit a 0.210 in. (5.33 mm) diameter rod shall also admit a 0.375 in. (9.53 mm) diameter rod. Holes or slots that are between 0.210 in. (5.33 mm) and 0.375 in. (9.53 mm) and have a wall thickness less than 0.375 in. (9.53 mm), but are limited in depth to 0.375 in. (9.53 mm) maximum by another rigid surface shall be permissible (see [Fig. 2](#)). The product shall be evaluated in all manufacturer's recommended use positions.



**FIG. 2 Opening Examples**

**5.5 Scissoring, Shearing, Pinching**— A product, when in a manufacturer's recommended use position, shall be designed and constructed so as to prevent injury to the occupant from any scissoring, shearing, or pinching when members or components rotate about a common axis or fastening point, slide, pivot, fold or otherwise move relative to one another. Scissoring, shearing, or pinching that may cause injury shall not be

permissible when the edges of any rigid parts admit a probe greater than 0.210 in. (5.33 mm) and less than 0.375 in. (9.53 mm) diameter at any accessible point throughout the range of motion of such parts.

**5.6 Exposed Coil Springs**— Any exposed coil spring which is accessible to the occupant, having or capable of generating a space between coils of 0.210 in. (5.33 mm) or greater during static load testing in accordance with [7.1.2](#) shall be covered or otherwise designed to prevent injury from entrapment.

## 5.7 Labeling

**5.7.1** Warning labels, whether paper or non-paper, shall be permanent when tested per [7.4.1-7.4.3](#).

**5.7.2** Warning statements applied directly onto the surface of the product by hot stamping, heat transfer, printing, wood burning, etc. shall be permanent when tested per [7.4.4](#).

**5.7.3** Non-paper labels shall not liberate small parts when tested in accordance with [7.4.5](#).

**5.8 Protective Components**— If a child can grasp components between the thumb and forefinger, or teeth (such as caps, sleeves, or plugs used for protection from sharp edges, points, or entrapment of fingers or toes), or if there is at least 0.040 in. (1.00 mm) gap between the component and its adjacent parent component, such component shall not be removed when tested in accordance with [7.5](#).

**5.9 Toys**— Toy accessories attached to, removable from, or sold with an infant walker, as well as their means of attachment, must meet applicable requirements of Consumer Safety Specification [F963](#).

## 6. Performance Requirements

**NOTE 1** — The forces that are to be applied to the sample in the tests described in [Section 7](#) of this specification are readily applied by means of a calibrated force gauge, or in the case of static load and dynamic load tests, by fixed masses.

### 6.1 Stability

**6.1.1 Tipping Resistance Against an Immovable Object**— A minimum stability index of 18 shall be required to tip over a walker either forwards or backwards when tested in accordance with [7.3](#).

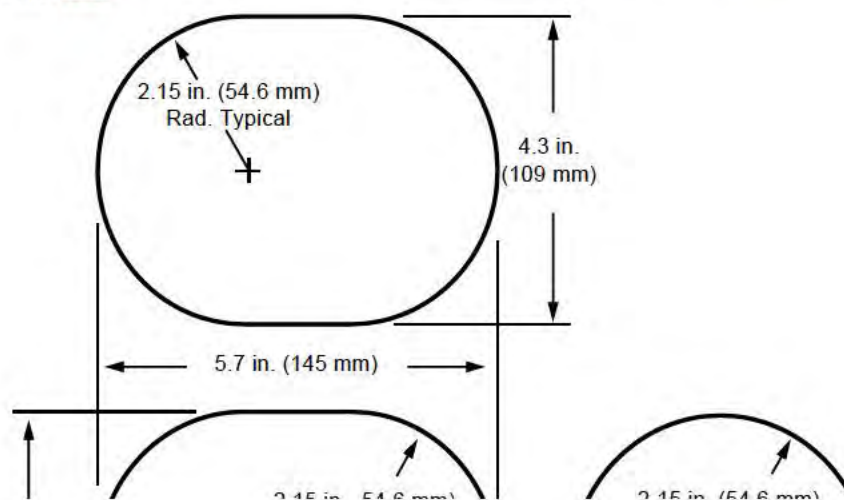
**6.1.2 Occupant Leaning Over Edge**— A walker shall remain upright (not tip over) when forces are applied forward, and sideward, in accordance with [7.3.4](#).

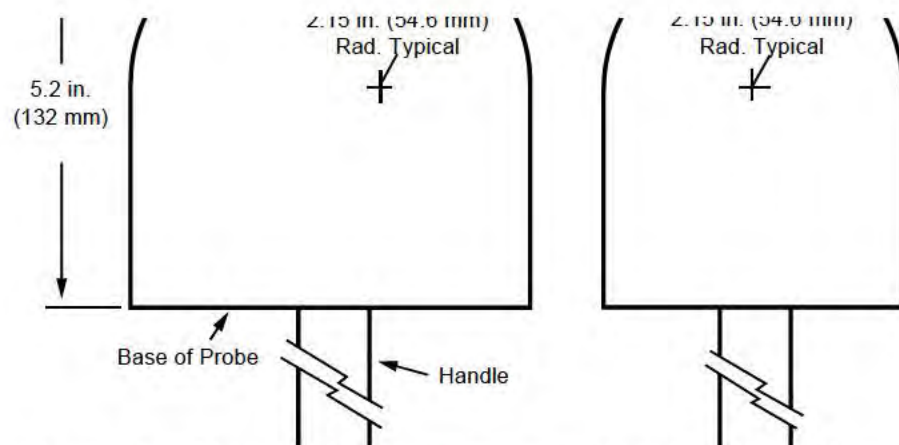
**6.2 Structural Integrity**— All tests that cover static and dynamic loading, and support of the occupant, are to be performed on the same product, sequentially and without refurbishing or repositioning of adjustment, if any. At test conclusion, there shall be no failure of seams, breakage of materials, or changes in adjustments that could cause the unit not to fully support the child or create a hazardous condition as defined in [Section 5](#). Maximum slippage of adjustable features, if any, is 1 in. (25 mm).

**6.2.1 Dynamic Load**— The occupant support member (seat) shall support a dynamic load when tested in accordance with [7.1.1](#).

**6.2.2 Static Load**— The walker shall not create a hazardous condition as defined in [5.4](#) when tested in accordance with [7.1.2](#).

**6.2.3 Leg Openings**— The seat of the walker shall be designed so that the leg openings will not permit passage of the test probe (see [Fig. 3](#)) when tested in accordance with [7.1.3](#).





NOTE — Dimensions are based on a 5th percentile 6-month-old child. Gauge may be modified to facilitate testing to allow for pulling of the gauge.

FIG. 3 Small Head Test Probe

**6.3 Prevention of Falls Down Step(s)**— The walker shall maintain contact with and be supported only by the test platform at the conclusion of the tests in [7.6](#).

**6.4 Parking Device (applicable to walkers equipped with parking brakes)**— The walker shall have a maximum displacement of 1.97 in. (50 mm) for each test in each direction (forward, rearward, and sideward) when tested in accordance with [7.7](#).

## 7. Test Methods

NOTE 2 — Except for the structural integrity tests (see [7.1](#)), that shall be performed first, the tests can be performed in any sequence.

### 7.1 Structural Integrity (see [6.2](#))

NOTE 3 — All wood blocks are fabricated from 1 in. nominal thickness lumber having a finish thickness of  $\frac{3}{4}$  in. (19 mm) unless otherwise stated.

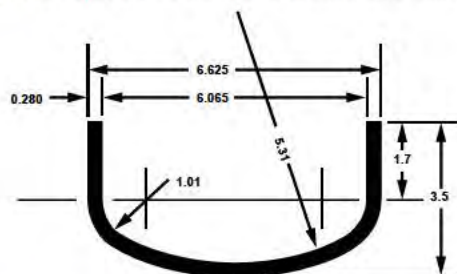
#### 7.1.1 Dynamic Load (see [6.2.1](#)):

**7.1.1.1** Position the walker in the manufacturer's recommended use position with all wheels on the floor. If adjustable, adjust to the highest and most upright position.

**7.1.1.2** Affix to the walker seat a 6 by 6 in. (150 by 150 mm) wood block. If the unit has a hammock type seat, use a standard 6 in. weld cap, as identified in [Fig. 4](#). Attach the weld cap to the bottom of the test weight with the convex surface down.

**7.1.1.3** Drop a test weight of 33 lb (15.0 kg), with the weight of the weld cap included, onto the seat at least a distance of 1 in. (25 mm) 100 times at a rate of  $4 \pm 1$  s per cycle.

**7.1.1.4** When testing a spring supported adjustable bouncer walker, test with the unit in the highest adjustment position and support the frame so that the dropping of the 33 lb (15.0 kg) weight does not cause the frame to bottom out artificially.



NOTE — Caps furnished to ANSI standards unless otherwise specified. Welding caps are formed from steel plate and are ellipsoidal in shape. The minor axis being equal to one half the major axis radii "R" and "r" closely approximate the actual semi-ellipsoidal shape. All dimensions in inches and are in accordance with ANSI B16.9.

FIG. 4 Nominal 6 in. Weld Cap Weight (Approximately) 6.4 lb

**7.1.2 Static Load (see 6.2.2):****7.1.2.1** Position the walker as in 7.1.1.1.

**7.1.2.2** Center a weight of 90 lb (40.8 kg) for a period of 1 min on a 6 by 6 in. (150 by 150 mm) wood block affixed to the walker seat. If the unit has a hammock type seat, use a standard 6 in. (150 mm) weld cap, convex surface down, as identified in Fig. 4 instead of the specified wood block. Include the weight of the weld cap in the 90 lb (40.8 kg) weight. If the natural action of a bouncer type walker will not allow the full application of 90 lb (40.8 kg) static load, then restrict the bouncer mechanism by any means possible so that the full static load can be applied to the seat or section of the walker occupied by the child.

**7.1.2.3** Position the walker in the manufacturer's recommended use position with all wheels on the floor. If adjustable, adjust to the lowest use position.

**7.1.2.4** Center a weight of 50 lb (22.7 kg) for a period of 1 minute on a 6 by 6 in. (150 by 150 mm) wood block affixed to the walker seat. If the unit has a hammock type seat, use a standard 6 in. (150 mm) weld cap convex surface face down, as identified in Fig. 4 instead of the specified wood block. Include the weight of the weld cap in the 50 lb (22.7 kg) weight. In this test DO NOT restrict the bouncer mechanism from folding or bottoming out. Observe visually the action of all supporting, locking, and adjusting components to make sure that they do not create a hazardous condition as defined in 5.4.

**7.1.3 Leg Openings Test (see 6.2.3):**

**7.1.3.1** If the seat is adjustable, adjust the seat to obtain the largest leg opening.

**7.1.3.2** Rotate the test probe shown in Fig. 3 to the orientation most likely to fail and gradually apply a force of 25 lbf (111 N). Apply the force perpendicular to the base of the probe within a period of 5 s and maintain it for an additional 10 s.

**7.2 Latching or Locking Mechanisms (see 5.3)**

**7.2.1** Erect the walker in accordance with the manufacturer's instructions and adjust to the highest and most upright recommended use position.

**7.2.2** Position the walker so that the normal folding motion is not impeded.

**7.2.3** Apply a force of 10 lbf (44 N) in the direction normally associated with folding the walker in accordance with manufacturer's instructions. Apply the force gradually over a 5-s period and maintain for an additional 10 s before releasing the force.

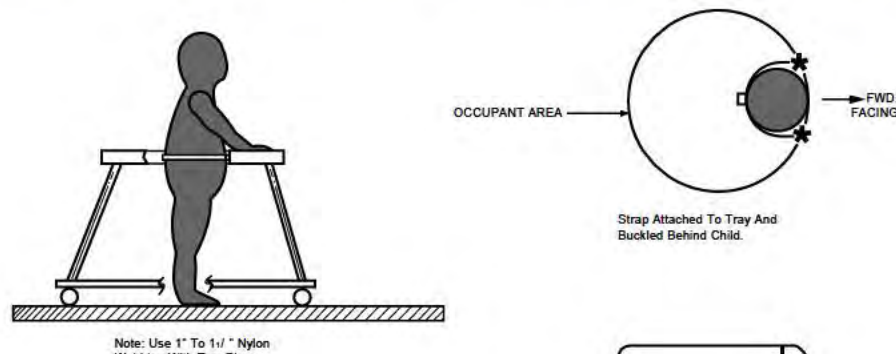
**7.2.4** Perform this procedure for a total of five times within a 2 min period.

**7.3 Stability Test (see 6.1)**

**7.3.1 Tipping Resistance Against An Immovable Object (see 6.1.1)**— Establish a horizontal test plane with a piece of ½ in. (13 mm) high by ¾ in. (19 mm) wide aluminum angle stop affixed thereto. Its length shall be a minimum of 6 in. (150 mm) wider than the width of the walker being tested.

**7.3.2 Forward Tip Resistance:**

**7.3.2.1** Place the walker on the horizontal test plane and adjust it to the manufacturer's highest recommended use position. If the walker has a reclinable seat, place it in its most upright position. Place a six month old CAMI Infant Dummy Mark II4 in the walker and affix it in a position so that its feet just touch the test plane and its abdomen is positioned firmly against the forward edge of the occupant area (see Fig. 5). If the Dummy's feet do not touch the test plane when the walker is in its highest use position, lower the walker until the Dummy's feet just touch the test plane.



walking with two-piece  
Adjustable Buckle Or  
Other Positive Attachment  
Method.

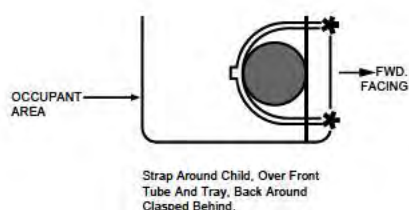


FIG. 5 Placement of CAMI Infant Dummy

**7.3.2.2** Position the walker so that its two most forward wheels are touching and perpendicular to the aluminum stop. For walkers that have offset wheels, place the wheels in the most disadvantageous position.

**7.3.2.3** Pretension by gradually applying 3 lbf (13 N) forward horizontal force at a level just below the CAMI Dummy's4 armpits in a direction perpendicular to the axis connecting the two most forward wheels and centered halfway between the wheels (see Fig. 6). Then increase the horizontal force until the walker tips over forward.

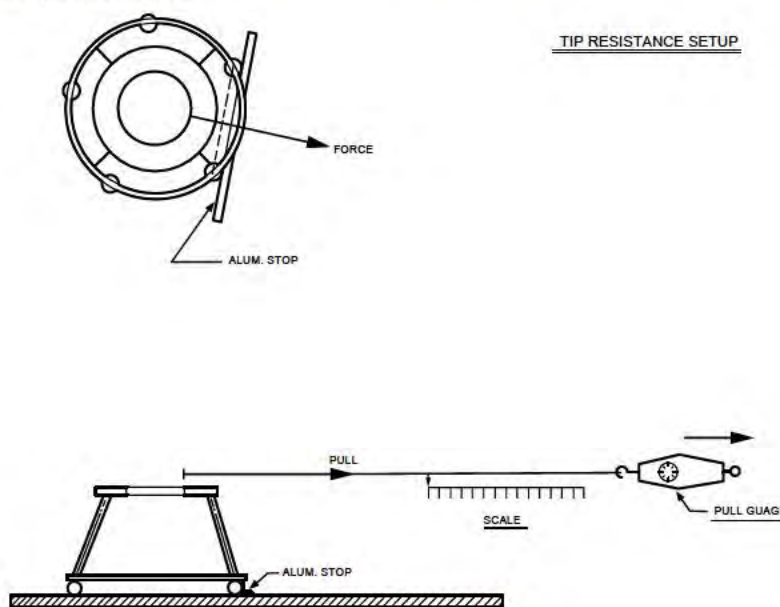


FIG. 6 Tip Resistance Setup

**7.3.2.4** If during the application of the force the front edge of the walker contacts the test plane and the wheels contacting the aluminum stop begin to lift upward, release the force allowing the walker to rest upon the test plane, remove the stop from the wheels and position a suitable stop against the front edge of the walker. Then reapply the force as specified in 7.3.2.3 until the walker tips over forward.

**7.3.2.5** Record the distance pulled in inches after pretensioning and the maximum force exerted in pounds (including pre-tensioning). The sum of the distance pulled and maximum force exerted shall be considered the stability index.

### 7.3.3 Rear Tip Resistance:

**7.3.3.1** Without adjusting the seat height or the height of the CAMI Dummy4 relative to the horizontal test plane, position the Dummy so that its back is firmly against the rear of the occupant area.

<sup>4</sup> CAMI Infant Dummy (Mark II), Department of Transportation, Memorandum Report AAC-119-74-14, Revision II, Drawing No. SA-1101 (see Fig. 7).





**NOTE —** This CAMI Infant Dummy was constructed in accordance with the Department of Transportation Specification dated April 29, 1975.

**FIG. 7 CAMI Infant Dummy—Mark II**

**7.3.3.2** Position the walker so that its two most rearward wheels are touching and perpendicular to the aluminum stop. For walkers that have offset wheels, place wheels in the most disadvantageous position.

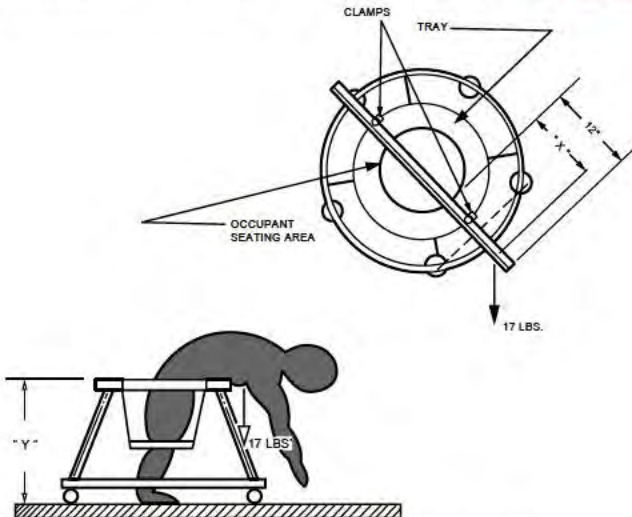
**7.3.3.3** Pretension by gradually applying a 3 lbf (13 N) horizontal force in a rearward direction perpendicular to the axis connecting the two most rear wheels and centered between the wheels. Apply the force at a level just below the CAMI Dummy's armpits. Then increase the force until the walker tips over. If the walker has a seat pad whose back is higher than the Dummy's armpits, apply the horizontal force at the same height as that of the Dummy's armpits.

**7.3.3.4** Record the distance pulled in inches after pretensioning and the maximum force exerted in pounds including pre-tensioning. The sum of the distance pulled and the maximum force exerted shall be considered the stability index.

**7.3.4 Occupant Leaning Outward Over Edge of Walker (see 6.1.2):**

**7.3.4.1** Position walker in the manufacturer's recommended use position with all wheels on the floor (flat horizontal plane). For walkers that have offset wheels, place wheels in the most disadvantageous position. If the walker is adjustable, adjust to its highest use position.

**7.3.4.2** Clamp a 1 by 1 in. (25 by 25 mm) rigid aluminum angle to the uppermost front and rear horizontal frame members of the walker in a direction perpendicular to the axis of the two most forward wheels and centered between the wheels. The length of the aluminum angle should be such that it extends forward at least 12 in. (300 mm) beyond the front edge of the occupant seating area (see Fig. 8).



**NOTE —** X inches depends on height of walker, Y = height of walker tray or uppermost frame member.

**FIG. 8 Leaning Over Setup**

**7.3.4.3** Locate the point on the aluminum angle that is 1 in. (25 mm) less than one half the difference between 32 in. (810 mm), and the height of the walker at the top edge of the tray adjacent to the seating area (see Fig. 8). Over a period of 5 s, gradually apply a vertically downward force of 17 lb to this point and maintain it for an additional 10 s.

**NOTE 4 —** 32 in. is the maximum height of the user.

**7.3.4.4** Repeat the steps in 7.3.4.1, 7.3.4.2, and 7.3.4.3, except position the aluminum angle in a sideward direction perpendicular to the axis connecting the two most sideward wheels and centered halfway between the wheels. Be sure the aluminum angle extends at least 12 in. (300 mm) beyond the inside edge of the tray or horizontal frame member. Placement of the 17 lb (7.7 kg) weight to the side shall not cause the walker to tip over.

#### 7.4 Permanency of Labels and Warnings (see 5.7)

**7.4.1** A paper label (excluding labels attached by a seam) shall be considered permanent if, during an attempt to remove it without the aid of tools or solvents, it cannot be removed, it tears into pieces upon removal, or such action damages the surface to which it is attached.

**7.4.2** A non-paper label (excluding labels attached by a seam) shall be considered permanent if, during an attempt to remove it without the aid of tools or solvents, it cannot be removed or such action damages the surface to which it is attached.

**7.4.3** A warning label attached by a seam shall be considered permanent if it does not detach when subjected to a 15 lb pull force applied in any direction most likely to cause failure using a  $\frac{3}{4}$  in. diameter clamp surface. Apply the force evenly over 5 s and maintain for an additional 10 s.

##### 7.4.4 Adhesion Test for Warnings Applied Directly onto the Surface of the Product:

**7.4.4.1** Apply the tape test defined in Test Method B-Cross-Cut Tape Test of Test Methods D3359 eliminating parallel cuts.

**7.4.4.2** Perform this test once in each different location where warnings are applied.

**7.4.4.3** The warning statements will be considered permanent if the printing in the area tested is still legible and attached after being subjected to this test.

**7.4.5** A non-paper label, during an attempt to remove it without the aid of tools or solvents, shall not be removed or shall not fit entirely within the small parts cylinder defined in 16 CFR 1501 if it can be removed.

#### 7.5 Removal of Components (see 5.8)

**7.5.1** Test components in accordance with each of the following methods in the sequence listed.

**7.5.2** Secure the walker so that it cannot move during the performance of the following tests.

**7.5.3 Torque Test**— A torque of 3 lbf·in. (0.3 N·m) shall be applied evenly within a period of 5 s in a clockwise direction until a rotation of 180° from the original position has been attained or 3 lbf·in. (0.3 N·m) has been exceeded. The torque or maximum rotation shall be maintained for an additional 10 s. The torque shall then be removed and the test components permitted to return to a relaxed condition. This procedure shall then be repeated in a counter-clockwise direction.

##### 7.5.4 Tension Test:

**7.5.4.1** Attach a force gauge to the cap, sleeve or plug by means of any suitable device. For components that cannot reasonably be expected to be grasped between thumb and forefinger, or teeth, on their outer diameter but have a gap of at least 0.040 in. (1.00 mm) between the rear surface of the component and the structural member of the walker to which they are attached, a clamp such as the one shown in Fig. 9 may be a suitable device.

15 lbf (67 N)  
Maximum Tension



JA354

FIG. 9 Tension Test Adaptor/Clamp

7.5.4.2 Be sure that the attachment device does not compress or expand the component so that it hinders any possible removal.

7.5.4.3 Gradually apply a 15 lbf (67 N) force in the direction that would normally be associated with the removal of the component over a 5 s period and hold for an additional 10 s.

## 7.6 Step(s) Tests (see 6.3) (Refer to Table 1 and Fig. 10)

### 7.6.1 Walker and Dummy Positioning for Step Tests:

7.6.1.1 Adjust the walker seat and tray to the manufacturer's highest recommended use position. If the walker has any consumer controllable features (that is, manual brakes, toy bars, etc.), place them in the configuration deemed most likely to cause failure of this test.

7.6.1.2 The dummy may be secured to the tray to maintain contact during the test. Raise the dummy's legs just enough so its feet do not touch the platform during the performance of the test and position using the rope specified in Fig. 10. The dummy's head shall remain unrestrained for all the step tests.

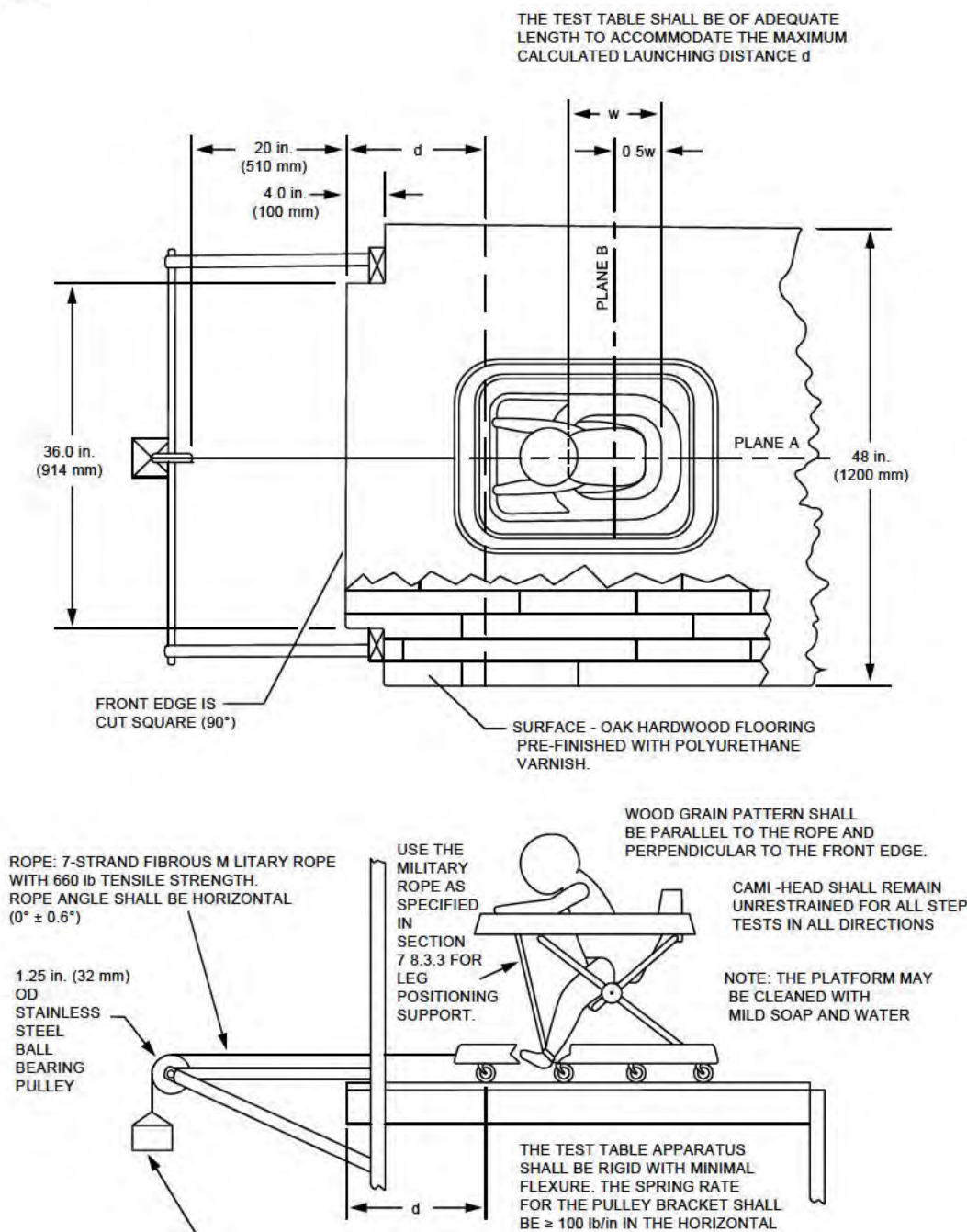




FIG. 10 Test Platform

**7.6.2** Establish a vertical Plane A that passes through the center of the seating area and is parallel to the direction the child faces. Establish a vertical Plane B that is perpendicular to Plane A and passes through the center of the seating area.

### 7.6.3 Forward Facing Step Test:

**7.6.3.1** Center the walker on the test platform facing forward so that Plane A is perpendicular to the front edge of the platform and the walker is distance  $d$  from the center of the most forward wheel(s) to the edge of the test platform.

$$d_{CAMI} = \frac{(V_f^2 - V_o^2) * (W_{CAMI} + W_{walker} + W_{drop\ weight})}{2g(W_{drop\ weight} - \mu_k N_{CAMI})} \quad (1)$$

TABLE 1 Summary of Step(s) Tests

| Section Number | Facing Direction of Walker | Weight of CAMI Dummy, lb | Simulated Speed, ft/s | Apply Tipover Test |
|----------------|----------------------------|--------------------------|-----------------------|--------------------|
| <u>7.6.3</u>   | forward                    | 17                       | 4                     | yes                |
| <u>7.6.3.7</u> | forward                    | 28 (vest)                | 4                     | yes                |
| <u>7.6.4</u>   | sideward                   | 17                       | 2                     | yes                |
| <u>7.6.4.7</u> | sideward                   | 28 (vest)                | 2                     | yes                |
| <u>7.6.5</u>   | rearward                   | 17                       | 4                     | no                 |
| <u>7.6.5.6</u> | rearward                   | 28 (vest)                | 4                     | no                 |

where:

$V_f$  = maximum velocity of walker at edge of platform (4 ft/s)

$V_o$  = initial velocity (0)

$W_{CAMI}$  = measured weight of CAMI dummy

$W_{walker}$  = weight of walker

$W_{drop\ weight}$  = drop weight (8 lb)

$\mu_k$  = dynamic coefficient of friction (0.05)

$N_{CAMI}$  = normal force (for CAMI dummy scenario) (weight of CAMI dummy + walker)

$g$  = acceleration of gravity (32.2 ft/s<sup>2</sup>)

Position the swivel wheels in such a way that the walker moves forward in a straight line parallel to Plane A.

**7.6.3.2** Place a CAMI Infant Dummy Mark II in the walker and position it as shown in [Fig. 11](#) with the torso contacting the front of the occupant seating area and arms placed on the walker tray.

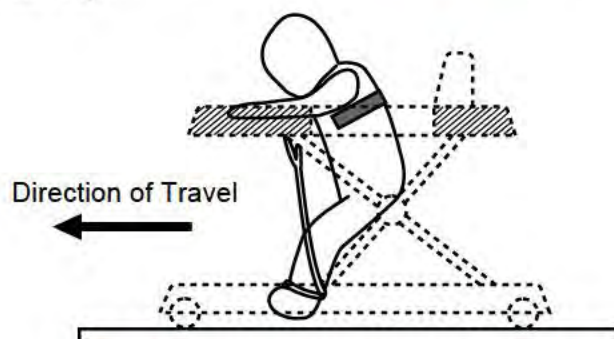


FIG. 11 Dummy Position for Forward Facing Test

**7.6.3.3** While holding the walker stationary, attach an 8-lb (3.6-kg) weight to the front of the walker base at Plane A by means of a 7-strand military rope with a 550 lb tensile strength (for example, paracord 550) and a stainless steel ball bearing pulley with an outside diameter of 1.25 in. (32 mm) and adjust the pulley so that the force is applied horizontally ( $0 \pm 0.5^\circ$  with respect to the table surface).

**7.6.3.4** Release the walker. When the walker comes to rest the 8 lb (3.6 kg) weight must still be applied to the walker.

**7.6.3.5** If any part of the walker extends over the edge of the test platform, perform the following tipover test. Without repositioning the walker, remove the CAMI dummy and the 8 lb (3.6 kg) weight. Perform the tipover test as specified in [7.3.4.2](#) and [7.3.4.3](#) except that the aluminum angle should be positioned in Plane A.

**7.6.3.6** Repeat [7.6.3.3-7.6.3.5](#) two additional times.

**7.6.3.7** Repeat [7.6.3.1-7.6.3.6](#) using the CAMI dummy with the weighted vest (see [Fig. 12](#)) and with distance computed using the following equation:

$$d_{\text{CAMI w/vest}} = \frac{(V_f^2 - V_o^2) * (W_{\text{CAMI w/vest}} + W_{\text{walker}} + W_{\text{drop weight}})}{2g(W_{\text{drop weight}} - \mu_k N_{\text{CAMI w/vest}})} \quad (2)$$

where:

$V_f$  = maximum velocity of walker at edge of platform (4 ft/s)

$V_o$  = initial velocity (0)

$W_{\text{CAMI w/vest}}$  = measured weight of CAMI dummy and weighted vest

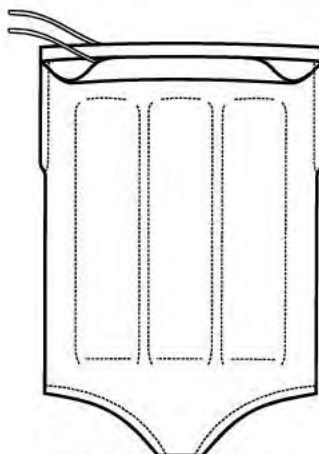
$W_{\text{walker}}$  = weight of walker

$W_{\text{drop weight}}$  = drop weight (8 lb)

$\mu_k$  = dynamic coefficient of friction (0.05)

$N_{\text{CAMI w/vest}}$  = normal force (for CAMI dummy fitted with 11 lb vest scenario) (weight of CAMI dummy + vest + walker)

$g$  = acceleration of gravity (32.2 ft/s<sup>2</sup>)



**FIG. 12 Weighted Vest**

#### **7.6.4 Sideward Facing Step Test.**

**7.6.4.1** Center the walker on the test platform facing sideways so that Plane B is perpendicular to the front edge of the platform and the walker is distance  $d$  from the center of the most sideward wheel(s) to the edge of the test platform.

$$d_{\text{CAMI}} = \frac{(V_f^2 - V_o^2) * (W_{\text{CAMI}} + W_{\text{walker}} + W_{\text{drop weight}})}{2g(W_{\text{drop weight}} - \mu_k N_{\text{CAMI}})} \quad (3)$$

where:

$V_f$  = maximum velocity of walker at edge of platform (2 ft/s)

$V_o$  = initial velocity (0)

$W_{CAMI}$  = measured weight of CAMI dummy

$W_{walker}$  = weight of walker

$W_{drop\ weight}$  = drop weight (8 lb)

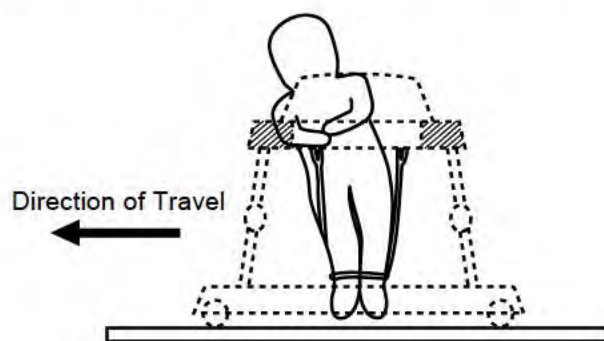
$\mu_k$  = dynamic coefficient of friction (0.05)

$N_{CAMI}$  = normal force (for CAMI dummy scenario) (weight of CAMI dummy + walker)

$g$  = acceleration of gravity (32.2 ft/s<sup>2</sup>)

Position the swivel wheels in such a way that the walker moves sideward in a straight line parallel to Plane B.

**7.6.4.2** Place a CAMI Infant Dummy Mark II in the walker and position it as shown in [Fig. 13](#) with the torso contacting the side of the occupant seating area.



**FIG. 13 Dummy Position for Sideward Test**

**7.6.4.3** While holding the walker stationary, attach an 8 lb (3.6 kg) weight to the side of the walker base at Plane B by means of a rope (as specified in [7.6.3.3](#)) and a pulley (as specified in [7.6.3.3](#)) and adjust the pulley so that the force is applied horizontally ( $0 \pm 0.5^\circ$  with respect to the table surface).

**7.6.4.4** Release the walker. When the walker comes to rest the 8 lb (3.6 kg) weight still must be applied to the walker.

**7.6.4.5** If any part of the walker extends over the edge of the test platform, perform the following tipover test. Without repositioning the walker, remove the CAMI dummy and the 8 lb (3.6 kg) weight. Perform the tipover test as specified in [7.3.4.2](#) and [7.3.4.3](#) except that the aluminum angle should be positioned in Plane B.

**7.6.4.6** Repeat [7.6.4.3-7.6.4.5](#) two additional times.

**7.6.4.7** Repeat [7.6.4.1-7.6.4.6](#) using the CAMI dummy with the weighted vest (see [Fig. 12](#)) and with distance computed using the following equation:

$$d_{CAMI\ w/vest} = \frac{(V_f^2 - V_o^2) * (W_{CAMI\ w/vest} + W_{walker} + W_{drop\ weight})}{2g(W_{drop\ weight} - \mu_k N_{CAMI\ w/vest})} \quad (4)$$

where:

$V_f$  = maximum velocity of walker at edge of platform (2 ft/s)

$V_o$  = initial velocity (0)

$W_{CAMI\ w/vest}$  = measured weight of CAMI dummy and weighted vest

$W_{walker}$  = weight of walker

$W_{drop\ weight}$  = drop weight (8 lb)

$\mu_k$  = dynamic coefficient of friction (0.05)

$N_{CAMI\ w/vest}$  = normal force (for CAMI dummy fitted with 11 lb vest scenario) (weight of CAMI dummy + vest + walker)

$g$  = acceleration of gravity (32.2 ft/s<sup>2</sup>)

### 7.6.5 Rearward Facing Step Test:

**7.6.5.1** Center the walker on the test platform facing rearward so that Plane A is perpendicular to the front edge of the platform and the walker is distance  $d$  from the center of the most rearward wheel(s) to the edge of the test platform.

$$d_{CAMI} = \frac{(V_f^2 - V_o^2) * (W_{CAMI} + W_{walker} + W_{drop\ weight})}{2g(W_{drop\ weight} - \mu_k N_{CAMI})} \quad (5)$$

where:

$V_f$  = maximum velocity of walker at edge of platform (4 ft/s)

$V_o$  = initial velocity (0)

$W_{CAMI}$  = measured weight of CAMI dummy

$W_{walker}$  = weight of walker

$W_{drop\ weight}$  = drop weight (8 lb)

$\mu_k$  = dynamic coefficient of friction (0.05)

$N_{CAMI}$  = normal force (for CAMI dummy scenario) (weight of CAMI dummy + walker)

$g$  = acceleration of gravity (32.2 ft/s<sup>2</sup>)

Position the swivel wheels in such a way that the walker moves rearward in a straight line parallel to Plane A. If the walker has an open back base design, attach the ends of a lightweight bar to the back of the walker near the wheels using loops of cord to allow the bar to float. The distance between the attachment points on the bar and those on the walker must be equal to prevent pulling the wheels inward or outward during the test. The cord from the 8-lb (3.6-kg) weight is then attached to the bar halfway between the attachment points (see Fig. 14).

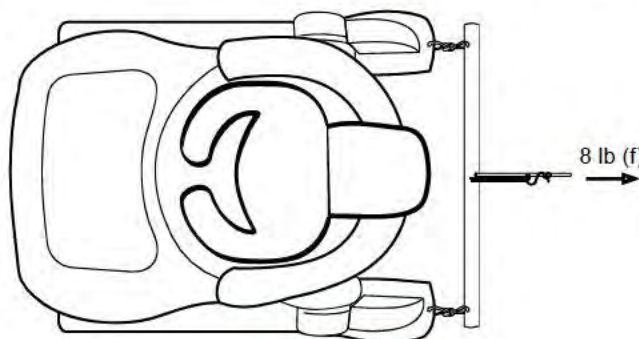
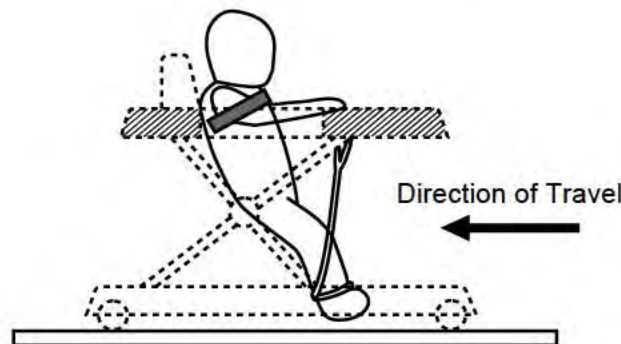


FIG. 14 Open Back Base

**7.6.5.2** Place a CAMI Infant Dummy Mark II in the walker and position it as shown in Fig. 15 with the torso contacting the back of the occupant seating area.



**FIG. 15 Dummy Position for Rear Facing Test**

**7.6.5.3** While holding the walker stationary, attach an 8 lb (3.6 kg) weight to the rear of the walker base at Plane A by means of a rope (as specified in [7.6.3.3](#)) and a pulley (as specified in [7.6.3.3](#)) and adjust the pulley so that the force is applied horizontally ( $0 \pm 0.5^\circ$  with respect to the table surface).

**7.6.5.4** Release the walker. When the walker comes to rest the 8 lb (3.6 kg) weight must still be applied to the walker.

**7.6.5.5** Repeat [7.6.5.3](#) and [7.6.5.4](#) two additional times.

**7.6.5.6** Repeat [7.6.5.1-7.6.5.5](#) using the CAMI dummy with the weighted vest (see [Fig. 12](#)) and with distance computed using the following equation:

$$d_{\text{CAMI w/vest}} = \frac{(V_f^2 - V_o^2) * (W_{\text{CAMI w/vest}} + W_{\text{walker}} + W_{\text{drop weight}})}{2g(W_{\text{drop weight}} - \mu_k N_{\text{CAMI w/vest}})} \quad (6)$$

where:

$V_f$  = maximum velocity of walker at edge of platform (4 ft/s)

$V_o$  = initial velocity (0)

$W_{\text{CAMI}}$  = measured weight of CAMI dummy

$W_{\text{walker}}$  = weight of walker

$W_{\text{drop weight}}$  = drop weight (8 lb)

$\mu_k$  = dynamic coefficient of friction (0.05)

$N_{\text{CAMI}}$  = normal force (for CAMI dummy scenario) (weight of CAMI dummy + walker)

$g$  = acceleration of gravity (32.2 ft/s<sup>2</sup>)

**7.7 Parking Device Test (see [6.4](#))**

**7.7.1** Perform the parking device test using a Test Mass that is A rigid cylinder  $6.30 \pm 0.04$  in. ( $160 \pm 1$  mm) in diameter,  $11.02 \pm 0.04$  in. ( $280 \pm 1$  mm) in height with a mass of 16.9 lb (7.65 kg), with its center of gravity in the center of the cylinder.

**7.7.2** Adjust the walker seat to the highest position (if applicable). Place the Test Mass vertically in the walker seat. Set any manual speed control to the fastest position (if applicable). Establish a vertical plane A that passes through the center of the seating area and is parallel to the direction the child faces. Establish a vertical plane B that is perpendicular to plane A and passes through the center of the seating area.

**7.7.3** Perform the parking device test in the forward, sideward, and rearward directions.

**7.7.4 Forward Facing Test of Parking Devices:**

**7.7.4.1** Position the walker including the Test Mass facing forward so that plane A is perpendicular to the front edge of the platform (see [Fig. 10](#)) and passes through the center of the pulley. Engage all parking devices in accordance with the manufacturer's instructions.

**7.7.4.2** Within 1 min of placing the walker with the Test Mass on the platform, attach an 8-lb (3.6-kg) weight gradually within 5 s to the walker frame base at plane A by means of a rope and a pulley per the test apparatus specifications in the step test procedure, adjusted so that the force is applied horizontally (rope angle shall be  $0 \pm 0.5^\circ$ ). Remove the 8-lb (3.6-kg) weight after 1 min. Measure the displacement.

**7.7.5 Sideward Facing Test of Parking Devices:**

**7.7.5.1** Position the walker including the Test Mass facing sideward so that plane B is perpendicular to the front edge of the platform and passes through the center of the pulley. Engage all parking devices in accordance with the manufacturer's instructions.

**7.7.5.2** Within 1 min of placing the walker with the Test Mass on the platform, attach an 8-lb (3.6-kg) weight gradually within 5 s to the walker frame base at plane B by means of a rope and a pulley per the test apparatus specifications in the step test procedure, adjusted so that the force is applied horizontally (rope angle shall be  $0 \pm 0.5^\circ$ ). Remove the 8-lb (3.6-kg) weight after 1 min. Measure the displacement.

**7.7.5.3** If the walker is equipped with fixed direction rear wheels and the walker is displaced in a curved path, establish the location of the rope attachment as the reference point and measure the linear displacement of that reference point after performing the procedure as described in [7.7.5.1](#) and [7.7.5.2](#).

#### **7.7.6 Rearward Facing Test of Parking Devices:**

**7.7.6.1** Position the walker including the Test Mass facing rearward so that plane A is perpendicular to the front edge of the platform and passes through the center of the pulley. Engage all parking devices in accordance with the manufacturers' instructions.

**7.7.6.2** Within 1 min of placing the walker with the Test Mass on the platform, attach an 8-lb (3.6-kg) weight gradually within 5 s to the walker frame base at plane A by means of a rope and a pulley per the test apparatus specifications in the step test procedure, adjusted so that the force is applied horizontally (rope angle shall be  $0 \pm 0.5^\circ$ ). Remove the 8-lb (3.6-kg) weight after 1 min. Measure the displacement.

## **8. Marking and Labeling**

**8.1** Each product and its retail package shall be marked or labeled clearly and legibly to indicate the following:

**8.1.1** The name of the manufacturer, distributor, or seller and either the place of business (city, state, and mailing address, including zip code) or telephone number, or both.

**8.1.2** A code mark or other means that identifies the date (month and year as a minimum) of manufacture.

**8.1.3** The markings on the product shall be permanent.

**8.1.4** Any upholstery label required by law shall not be used to meet the requirements of [8.1](#).

**8.2** Each walker shall be labeled with warning statements. The warning statements shall be in contrasting color(s), permanent, conspicuous, and in sans serif style font.

**8.2.1** In warning statements, the word "**WARNING**" shall not be less than 0.2 in. (5 mm) high and the remainder of the text shall be in letters not less than 0.1 in. (2.5 mm) high except as specified.

**8.2.2** The warnings shall include the following exactly as stated below:

#### **⚠ WARNING**

Never leave child unattended. Always keep child in view while in walker.

**8.2.3** Additional warnings shall address the following:

**8.2.3.1** Use only on flat surfaces free of objects that could cause the walker to tip over.

**8.2.3.2** To avoid burns, keep the child away from hot liquids, ranges, radiators, space heaters, fireplaces, etc.

**8.2.3.3** If the walker is equipped with a parking brake, a warning statement shall address the following:

WARNING: Parking brake use does not totally prevent walker movement. Always keep child in view when in the walker, even when using the parking brakes.

**8.2.4** Each walker shall be labeled with a separate stairs warning visible to the consumer when placing the child in the walker.

**8.2.4.1** In the stairs warning, the safety alert symbol "⚠" and the word "**WARNING**" shall not be less than 0.2 in. (5 mm) high and shall be black lettering on orange background surrounded by a black border. The remainder of the text shall be characters whose upper case shall be at least 0.1 in. (2.5 mm) high and shall be black lettering on white background.

**8.2.4.2** The stairs warning shall be stated exactly as follows:

#### **⚠ WARNING—STAIR HAZARD**

Avoid serious injury or death

Block stairs/steps securely before using walker even when using parking brake

1. The statement "even when using parking brake" applies only to walkers equipped with a parking brake.

## **9. Instructional Literature**

**9.1** Instructions must be provided with the walker, and shall be easy to read and understand. Assembly, maintenance, cleaning, operating, folding instructions, and warnings, where applicable, must be included.

**9.1.1** The instructions shall include the following:

Read all instructions before assembly and use of the walker.  
Keep instructions for future use.

**9.2 *Warning Statements with the Instructional Literature:***

**9.2.1** In warning statements located in the instructional literature, the letters of the word **"WARNING"** shall not be less than 0.2 in. (5 mm) high and the remainder of the text shall be in letters not less than 0.1 in. (2.5 mm) high.

**9.2.2** If the unit is designed with a restraint, the instructions must advise that the restraint system be used.

**9.2.3** The instructions must indicate the manufacturer's recommended height, weight, or age, or combination thereof, of the child for which the walker is intended. If the walker is not intended for use by a child who can already walk unassisted, the instructions shall so state this limitation.

**9.2.4** The instructions shall contain warning statements which address the following:

1. Do not use the walker if it is damaged or broken.
2. Do not use until baby can sit up by itself.
3. *Address the following if the walker uses friction devices to pass the stair test:* Clean (*friction components*) regularly to maintain stopping performance.

**9.2.5** The instructions must include all warnings in 8.2.

## **10. Keywords**

**10.1** infant walker

## **APPENDIX (Nonmandatory Information)**

### **X1. RATIONALE**

**X1.1** The 8 lb falling weight is based on the horizontal force generated when ten different children were tested in walkers. The children ranged in age from 6 ½ to 11 months and in weight from 15 to 23 lb. The children were placed in walkers on several different floor surfaces and the force they generated to move the walker was measured. The highest measured force out of approximately 125 readings was 7.5 lb.

**X1.2** The use of the falling weight simulates a child in a walker approaching a step at approximately 4 ft/s (for the forward and rearward directions) or 2 ft/s (for the sideward direction). It assumes the walker's weight is 8 lb, the child's weight is 17 lb (or 28 lb), and the walker has normal caster wheels with normal rolling friction. By varying distance  $d$ , the desired number of ft/s can be achieved.

**X1.3** The 4 ft/s is based on the test results of seven different children in walkers. The maximum speed attained was 4.02 ft/s. It should be noted that the children were selected because they were judged to be very active in a walker. Additionally, top speeds were sustained for only very brief moments under ideal conditions, that is, smooth floors with plenty of space to get up speed.

**X1.4** The test is performed at both ends of the weight range for children who use walkers. The CAMI Infant Dummy Mark II represents the 50th percentile weight of 6 to 8 month old children. The 28 lb CAMI Infant Dummy (CAMI with weighted vest) represents the 95th percentile weight of 12 to 15 month old children.

**X1.5** The 17 lb weight in the tipover test simulates a child leaning forward or sideways over the edge of the occupant seating area. Seventeen pounds represents the upper body weight of children in the 12 to 15 month age range (17 lb = % of 28 lb, the 95th percentile weight of 12 to 15 month old children.)

**X1.6** The tipover sequence is not included in the rearward facing tests since the walker seat back prevents a child from leaning backward in a walker to any significant degree.

**X1.7** The use of a 36 in. opening on the test platform is based on a CPSC study of walker stair/step incidents in which approximately 80 % of the openings the walkers passed through prior to going over steps were 36 in. or less.

**X1.8 Sections 6.2.3 and 7.1.3**— This test is to address entrapment in the leg openings. Leg openings are evaluated after application of a 25-lbf force to the small head probe. This is the same force used in evaluating leg openings in passive restraint systems in high chairs, entrapment in non-full-size crib/play yard attachments, entrapment in shelves in changing tables, and for evaluating mattress support systems in full-size cribs and non-full-size cribs/play yards. Users of these products are of similar developmental stage to users of infant walkers.

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or [service@astm.org](mailto:service@astm.org) (e-mail); or through the ASTM website ([www.astm.org](http://www.astm.org)). Permission rights to photocopy the standard may also be secured from the ASTM website ([www.astm.org/COPYRIGHT/](http://www.astm.org/COPYRIGHT/)).*

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

|  |                                   |
|--|-----------------------------------|
| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
|--|-----------------------------------|

**DECLARATION OF JAMES T. PAULEY**  
**IN SUPPORT OF PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT**

I, James T. Pauley, declare as follows:

1. I am the President and Chief Executive Officer of the National Fire Protection Association ("NFPA"). I am generally responsible for the management, direction and administration of NFPA and its activities including its standards development activities. I have held this position since July 1, 2014. The following facts are based upon my own personal knowledge, and if called upon to do so, I could and would testify competently thereto.

**Background**

2. I am a native of Kentucky, and I have a degree in electrical engineering from the University of Kentucky.

3. Prior to my employment with NFPA, I worked in the electrical industry for nearly 30 years, beginning in 1985. I began my career as an engineer for Square D, an electrical equipment manufacturer, and then worked for Schneider Electric, an electrical distribution and management company, after it acquired Square D in 1991. My responsibilities at Schneider Electric included product development and marketing, industry standards, and global standards strategy. In 2001, I became a vice president of industry standards and government relations at Schneider Electric. In 2011, I became senior vice president for external affairs and government relations and a member of the company's U.S. executive management team. I held that position until being named NFPA's president in 2014.

4. NFPA is a nonprofit organization, based in Quincy, Massachusetts, devoted to eliminating death, injury, and property and economic loss due to fire, electrical, and related hazards. NFPA was founded in 1896, and has continuously developed standards since that time. The association delivers information and knowledge through more than 300 consensus codes and standards, research, training, education, outreach and advocacy. NFPA's membership totals more than 65,000 individuals throughout the world.

5. Standards development is NFPA's principal activity and serves to further NFPA's mission of reducing the risk of loss from fire, electrical, and related hazards. NFPA develops standards based on the best available research and input from a wide variety of stakeholders. These standards provide guidance, instructions, and best practices to prevent the occurrence of disasters, manage their impact, and protect human life and property.

6. NFPA has continuously asserted copyright in its standards and made copies of its standards available for sale to the public since it first began publishing standards. The revenue

NFPA has obtained from the sale of its copyrighted standards has been NFPA's primary means of financial support for many decades.

7. NFPA's flagship standard is NFPA 70, the National Electrical Code ("NEC"). The first edition of the NEC was published in 1897. NFPA currently releases a new edition of the NEC on a three-year cycle. The current edition of the NEC is the 2014 edition, which is over 900 pages long. The prior edition was the 2011 edition.

8. The NEC addresses the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways in commercial, residential, and industrial occupancies. The NEC is the world's leading standard for electrical safety and provides the benchmark for safe electrical design, installation, and inspection to protect people and property from electrical hazards.

9. Additional NFPA standards include NFPA 101, the Life Safety Code. The Life Safety Code is the most widely used standard for building construction, protection, and occupancy features that minimize the effects of fire and related hazards on human life. The Life Safety Code includes provisions for building egress, fire protection features, sprinkler systems, alarms, emergency lighting, smoke barriers, and special hazard protection.

10. Many NFPA standards are incorporated by reference in federal and state laws and regulations. NFPA is aware that its standards are frequently incorporated by reference, but NFPA does not develop any standards solely for that purpose.

11. NFPA develops new standards based on a determination that developing a standard in a particular area would serve NFPA's mission of reducing the risk of loss from fire and related hazards. NFPA does not consider whether the standard will generate revenue when deciding whether to develop the standard.

12. All NFPA standards have a range of applications and uses even if they are not incorporated by reference in government laws or regulations. For example, the nationwide use of the NEC by builders and electrical manufacturers ensures that consumers may travel throughout the United States with the expectation that their electrical appliances can be plugged in and will operate safely and effectively. Additionally, widespread use of the NEC and the Life Safety Code provide benchmark safety guidance that can be relied on by individuals, companies, and insurers, among others.

13. The primary users of NFPA standards are professionals and tradespeople who use these standards in the course of their business, such as electricians, architects, and electrical equipment manufacturers. NFPA makes its standards available, both for free viewing and for sale, through a variety of channels, including through its website, through a mail-order catalog distributed to NFPA members, and through various retail outlets.

#### **NFPA's Process of Developing Voluntary Consensus Standards**

14. Private-sector standards development in the United States is generally coordinated and accredited by the American National Standards Institute ("ANSI"). ANSI is a nonprofit membership organization that facilitates the development of private sector standards and promotes their integrity by accrediting standards development organizations ("SDOs") whose procedures comply with ANSI's Essential Requirements. I am familiar with ANSI requirements, having served as chair of the ANSI Board of Directors from January 2012 through May 2014.

15. To achieve ANSI accreditation, an SDO's standards development committees must contain balanced membership, taking into account the views of a variety of groups including technical experts on the subject matter of the standard, consumer representatives, government representatives, and industry representatives. ANSI accreditation also requires that

the SDO maintain open proceedings; provide public notice of standards development activity; allow opportunity for public comment; give consideration and response to public comments; and provide an opportunity to appeal committee decisions. Standards that are developed in accordance with ANSI requirements are known as voluntary consensus standards.

16. ANSI periodically audits all its accredited developers to verify that they are following their ANSI approved procedures. NFPA is classified as an Audited Designator by ANSI because it submits to more in-depth ANSI auditing of its standards process. This allows NFPA to designate its standards as “American National Standards” (ANSs) when they complete the NFPA process. All NFPA standards carry the ANS designation and are revised frequently to remain current with state-of-the-art technology developments.

17. I have been familiar with NFPA standards and the NFPA standards development process for many years, including before I became President of NFPA. From 2000 to 2013, I served on NFPA’s Standards Council, and I served as Chair of the Standards Council from 2008 to 2013. The Standards Council oversees NFPA’s standards development activities, administers the rules and regulations, and acts as an appeals body.

18. NFPA’s rigorous and open standards development process requires NFPA to expend substantial resources on standards development. In addition to the time contributed by the thousands of volunteers who participate in NFPA standards development, NFPA pays for salary and benefits for its own administrative, editorial, and expert staff, office space, meeting facilities for the more than 250 Technical Committees who participate in NFPA standards development processes, outreach and education efforts, information technology, and other costs.

19. Each NFPA standard goes through two full rounds of public and committee input, comments, review and drafts before being finalized.

20. NFPA is continuously investing in improvements to its standards development process. For example, NFPA has recently spent significant sums to build a computerized interface that allows for the online development and revision of its standards. NFPA has spent more than \$2.9 million on this system over the past four years.

21. NFPA has also expended resources to increase the participation of underrepresented groups on its Technical Committees, including by creating an Enforcer Funding Program to raise the percentage of government enforcement officials on the Committees by reimbursing these officials for the majority of their travel costs and other costs of Committee membership.

22. NFPA's standards are state of the art. NFPA systematically and regularly revises and updates its standards. The most used NFPA standards, including the NEC, are revised on a three-year cycle in order to keep pace with changes in technology and design, and advances in safety research and understanding.

23. The standards that emerge from this process are sophisticated and complex technical works that provide unique guidance and best practices covering a wide range of topics. These works reflect creative input and decisions from all of the many participants in the standards development process.

24. NFPA's standards development process incorporates significant creative input from three primary groups of participants. These include (i) members of the public who provide input and comment; (ii) the members of the Technical Committees who consider and vote on proposed changes to the standards; and (iii) the NFPA staff who assist and advise the Technical Committees and who draft and finalize the wording of the actual document that, through the balloting and voting process, becomes the standard.

25. NFPA publishes its standards with copyright notices that alert the public, including the people who participated in the standards development process, that the copyright is owned by NFPA.

26. NFPA is not aware of any other person who claims to have any copyright interest in NFPA standards.

27. Members of the public participate in NFPA's standards development process by submitting input, including proposed changes to NFPA standards and comments on proposed changes. It is NFPA policy that all persons who submit public input must assign all rights, including copyright, in their contributions to NFPA. NFPA does not accept public input without a signed copyright assignment, which is printed on the standard forms by which members of the public submit input.

28. In my experience, members of the public who make contributions to the standards development process understand and intend that NFPA will own the copyright in their contributions and in the standards. I have never heard any contributor suggest that NFPA did not own the copyright in NFPA standards or that the contributors have any rights in NFPA standards.

29. Prior to my employment with NFPA, and during the time I was employed in the electrical manufacturing industry, I personally submitted proposals and comments on NFPA standards. For example, I submitted several proposals and comments for the 2011 NEC, with specific suggestions for revisions to the wording of various provisions of the NEC. The Technical Committees accepted some of my proposals and comments, and they were incorporated into the final standards..

30. Like all members of the public who submit input, I submitted these comments and proposals on the standard NFPA forms for such submissions. As part of submitting the forms, I

expressly agreed that I assigned all and full copyrights in my contributions to NFPA. I understood and expressly intended that NFPA would own the copyright both in my contribution and in the final standard. True and correct copies of some of the proposals and comments that I submitted for the 2011 NEC, including my signed assignment of copyright in my contributions to NFPA, are attached hereto as Exhibit A.

31. As I have explained above, many other members of the public also have submitted proposals and comments for NFPA standards, and they, too, have executed copyright assignments relating to their contributions. I have attached hereto as Exhibit B a sampling of true and correct copies of proposals and comments submitted by members of the public for the 2014 NEC, including their signed assignments of copyright in their contributions, are attached hereto as Exhibit B.

32. The members of NFPA Technical Committees also contribute to NFPA's standards development process. The Technical Committees are the principal consensus bodies responsible for the development and revision of NFPA standards.

33. The Technical Committees meet to consider proposals submitted by the public, and they may also suggest their own revisions to the standards. The Committees discuss and reach consensus on which changes should be made. For a large standards such as the NEC, there are multiple Technical Committees. There is a Technical Correlating Committee that oversees the overall NEC development process, and there are several Technical Committees known as Code-Making Panels that are responsible for particular sections of the NEC.

34. It is NFPA policy that anyone who wishes to become a Technical Committee member submits an application on NFPA's Committee Application form, including by signing an assignment of copyright to NFPA. Attached hereto as Exhibit C is a true and correct copy of

the NFPA Technical Committee Application form. The Application contains the following language, which has remained unchanged in substance for many years:

I agree that any material that I author, either individually or with others, in connection with work performed as a member of an NFPA Technical Committee shall be considered to be works made for hire for the NFPA. To the extent that I retain any rights in copyright as to such material, or as to any other material authored by me that I submit for the use of an NFPA Technical Committee in the drafting of an NFPA code, standard or other NFPA document, I hereby grant and assign all and full rights in copyright to the NFPA. I further agree and acknowledge that I acquire no rights in any publication of the NFPA and that copyright and all rights in materials produced by NFPA Technical Committees are owned by the NFPA and that the NFPA may register copyright in its own name.

35. Before being employed by NFPA, I served on a number of NFPA Technical Committees, including, for example, the Code-Making Panel No. 2 for the 2011 and 2014 editions of the NEC. Each time I applied to be a member of a Technical Committee, I submitted a Committee Application form in which I signed the copyright assignment containing the language quoted in paragraph 29 of this Declaration. It has for many years been NFPA's policy and practice that all members of NFPA Technical Committees execute such copyright assignments.

36. In my work on NFPA Technical Committees, I understood, agreed, and expressed the intention that NFPA would own the copyright in the final standards, consistently with the Committee Application form I had submitted.

37. In my experience participating on the Technical Committees, I understood that all members of the Committees shared the understanding and expressed the common intention that NFPA would own the copyright in the final standard. I have frequently heard other Technical Committee members refer to NFPA's copyright ownership of NFPA standards. I have never heard any member of a NFPA Technical Committee suggest that NFPA does not own the

copyright in NFPA standards or that the Technical Committee members retain any rights in their contributions to the standards.

38. NFPA staff also participate in NFPA's standards development process in the course of their employment. NFPA technical staff assist and advise the Technical Committees, and NFPA technical and editorial staff revise and finalize the wording of the actual document that becomes the standard.

39. There is an NFPA staff liaison assigned to every NFPA Technical Committee. Each staff liaison has technical expertise in the appropriate field, and the staff liaisons provide information and advice to the Committee during Committee meetings.

40. The staff liaisons also record the decisions made at the Committee meetings about revisions to NFPA standards. NFPA staff liaisons work together with the Committees to craft appropriate wording in the draft of the standard that accurately captures the intent and purpose of Committee decisions. The technical staff are also responsible for ensuring that revisions to the standard are drafted in a way that maintains technical and editorial consistency across the different sections of the standard.

41. After Technical Committee meetings, the technical staff work with NFPA editorial staff to finalize the language of the draft standard before submitting it for balloting by the Technical Committees. Every revision and modification in the text of an NFPA standard goes through multiple levels of review and revision by NFPA technical and editorial staff.

42. NFPA invests significant resources in the development of each new edition of the NEC. For example, the development process of the 2017 NEC is currently ongoing. The preparation of the first draft report involved consideration of over 4,000 proposals from the public. A total of 485 Technical Committee members on 19 Code-Making Panels, who were

supported by at least 45 NFPA staff members, held concurrent, multi-day committee meetings for a total of 75 meeting days over a two-week period. The first draft was finalized by a four-day meeting of the Technical Correlating Committee, assisted by three NFPA staff members. The preparation of the second draft report, which is ongoing now, has so far involved consideration of over 1,500 public comments, and a large number of Committee meetings over a two-week period, assisted by at least 19 NFPA staff members. There will be two more multi-day Technical Correlating Committee meetings prior to the issuance of the NEC. In addition, there have been numerous conference calls, online seminars, and other interactions among Committee Members and NFPA staff.

43. The final versions of the standard also go through a rigorous quality control process by NFPA staff, to ensure that the final document is as accurate as possible. This painstaking review is costly, but NFPA commits the resources because technical accuracy of NFPA standards is essential for NFPA's mission of promoting public safety.

#### **How NFPA Funds Its Standards Development**

44. NFPA sells its standards at reasonable cost and in a variety of formats. For example, the 2014 edition of the NEC, which is 910 pages long, is offered for purchase as a PDF, an eBook, or in softcover, looseleaf, or spiralbound versions. The price for the NEC ranges from \$95 to \$105, depending on the format in which it is purchased. NFPA's other standards are sold at prices ranging from \$39 to \$100, depending on the length of the standard and other factors. NFPA also makes several digital subscription services available, so interested purchasers can obtain unlimited digital access to a variety of NFPA standards.

45. In addition, NFPA is committed to providing the full text of NFPA standards available for free viewing on its website. For more than a decade, NFPA has provided such

access to its standards, in read-only format, and all NFPA standards can currently be accessed on NFPA's website at [www.nfpa.org/codes-and-standards/free-access](http://www.nfpa.org/codes-and-standards/free-access). This access allows any member of the public to review NFPA standards in full and without cost. NFPA also encourages jurisdictions that incorporate its standards by reference to link their websites to its free, online version of the standards, and provides a widget that easily enables such access.

46. NFPA funds its standards development activities primarily with the revenue obtained from sales of its copyrighted standards. For example, in 2014 NFPA's publications sales accounted for over 70% of NFPA's total operating revenues. The overwhelming majority of that publications revenue comes from the sale of codes and standards.

47. NFPA would not be able to maintain its existing voluntary consensus standards development and revision processes at current levels if there were a significant reduction in the revenue it obtains from the sale of publications.

48. If NFPA were unable to maintain its current level of standards development and revision activities, the standards would not keep up with technological advancements to address fire, electrical and related hazards nor would they reflect the most current knowledge and experience of the experts who participate in the process. This failure would result in a lower level of overall public safety.

49. In NFPA's experience, to preserve the revenue from sales of publications, NFPA must be able to assert copyright in its standards to prevent unauthorized copying of NFPA standards, which threaten to substantially undermine NFPA's sales.

50. NFPA has attempted for years to develop alternative sources of revenue but has been unable to identify any such revenue sources that would come close to replacing the revenue from sales of NFPA standards.

51. If NFPA were to lose copyright protection of its standards and the related revenue, NFPA would have to significantly limit its activities. Such limitations could include ceasing to develop standards that, while important, do not necessarily generate sufficient revenue to cover their costs including, for example, personal protective equipment standards that help keep fire fighter personnel safe.

**Harm to NFPA From Public.Resource.Org's Unauthorized Appropriation and Use of NFPA's Copyrighted Codes and Trademarks**

52. The activity of Public.Resource.Org, in posting unauthorized copies of NFPA standards on the internet, threatens NFPA's ability to generate revenue from these standards and its ability to continue to fund the development of new and updated standards.

53. In addition, Public.Resource.Org's posting of unauthorized copies that have not gone through NFPA's quality control process threatens the reputation for careful and quality publications that NFPA has built up for over a century and undermines the goodwill associated with NFPA's name.

54. I understand that Public.Resource.Org converted NFPA standards to html format and posted the html versions on the internet. The conversion process inevitably resulted in errors. For example, I am aware that the html version of the 2011 version of the NEC that was posted to Public.Resource.Org's website contains many errors. These include many obvious typographical errors, but they also include errors that distort the meaning of the standard. Some of those errors are:

- a. Article 310.10(F) of the 2011 NEC addresses conductors used in direct-burial applications, and states: "Cables rated above 2000 volts shall be shielded." This requirement that high-voltage cables in direct-burial applications be shielded is important to prevent damage to the cables and a resulting risk of electrical shock.

This language, however, is completely omitted from the html version that was posted on Public.Resource.Org's website.

- b. Article 424.59 of the 2011 NEC states that “heaters installed within 1.2m (4 ft) of the outlet of an air-moving device ... may require turning vanes, pressure plates, or other devices on the inlet side of the duct heater to ensure an even distribution of air over the face of the heater.” In Public.Resource.Org's html version however, the “m”—representing meters—is incorrectly rendered as “in”—which represents inches. In other words, the Public.Resource.Org version says that the requirement is only triggered if a heater is less than 1.2 *inches* from an air-moving device, rather than the correct and much greater distance of 1.2 meters.
- c. Article 430.35(B) of the 2011 NEC states that “motor overload protection shall not be shunted or cut out during the starting period if the motor is automatically started.” Inadequate motor overload protection can result in overheating and damage. In Public.Resource.Org's html version, however, this provision incorrectly says that motor overload protection shall not be shunted or cut out during the “stalling period.”
- d. A similar error occurs in Article 502.134(b)(5), which identifies requirements for “starting and control equipment for electric-discharge lamps.” In Public.Resource.Org's html version, this article erroneously refers to “stalling and control equipment.”
- e. Article 517.2 of the 2011 NEC defines “X-Ray Installations, Portable” as “X-ray equipment designed to be hand-carried.” In Public.Resource.Org's html version,

however, this definition erroneously refers to "X-ray equipment designed to be hand-earned."

- f. There are many typographical errors in the cross-references in Public.Resource.Org's html version. In order to understand a provision of the NEC that contains a cross-reference, the user must be able to identify and refer to the Article identified in that cross-reference. However, Public.Resource.Org's html version contains many erroneous cross-references, including in Articles 110.14(B)(1), 310.10(E), 410.140, 430.75, 504.70, 645.10(B), 670.3(B), and 680.25(B).

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct and that this declaration was executed this 18 day of November 2015 at Quincy, Massachusetts.

  
JAMES T. PAULEY

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

AMERICAN SOCIETY FOR TESTING AND  
MATERIALS d/b/a/ ASTM INTERNATIONAL;

NATIONAL FIRE PROTECTION  
ASSOCIATION, INC.; and

AMERICAN SOCIETY OF HEATING,  
REFRIGERATING, AND AIR-CONDITIONING  
ENGINEERS, INC.

Plaintiffs,

v.

PUBLIC.RESOURCE.ORG, INC.,

Defendant.

Case No. 1:13-cv-01215-TSC-DAR

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PUBLIC.RESOURCE.ORG, INC.,

Counterclaimant,

v.

AMERICAN SOCIETY FOR TESTING AND  
MATERIALS d/b/a/ ASTM INTERNATIONAL;

NATIONAL FIRE PROTECTION  
ASSOCIATION, INC.; and

AMERICAN SOCIETY OF HEATING,  
REFRIGERATING, AND AIR-CONDITIONING  
ENGINEERS, INC.

Counterdefendants.

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**DECLARATION OF STEPHANIE REINICHE**

I, Stephanie Reiniche, declare as follows:

1. I am currently employed by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (“ASHRAE”) as its Senior Manager of Standards. I have been employed by ASHRAE since 2003. Based on the information known to me as a result of the duties and responsibilities of my position, as well as information I have gathered from relevant ASHRAE personnel and staff, I have personal knowledge of the facts set forth herein and could and would testify competently thereto if called as a witness.

2. ASHRAE is a non-profit organization that operates with the mission of advancing the arts and sciences of heating, ventilating, air conditioning and refrigerating to serve humanity and promote a sustainable world. ASHRAE has leveraged its expertise in HVAC systems, as well as the expertise of its volunteer members, to develop and maintain over 100 consensus based standards. These standards, which are developed based needs in the industry, apply to a variety of fields within the building industry, such as energy efficiency, indoor air quality, refrigeration, and sustainability.

3. The specific ASHRAE standard that I understand to be at issue here, Standard 90.1, pertains to energy efficiency in commercial and high-rise residential buildings. The standard has a variety of uses, including use by builders as a best-practices guide to achieve greater energy efficiency in building projects (even when not required by law) and use as a guide for how to achieve LEED certification for new buildings (a private rating system for energy efficiency in new buildings administered by the U.S. Green Building Council). Though Standard 90.1 is sometimes incorporated into laws and government regulations, such incorporation is not the primary motivation for ASHRAE’s continued maintenance and updating of Standard 90.1. In fact, ASHRAE’s drafting and maintenance of Standard 90.1 dates back to the 1970s and significantly

predates Standard 90.1's widespread incorporation into federal laws or regulations—e.g., the most significant law referencing Standard 90.1, the Energy Policy Act, was not passed until 1992.

Additionally, ASHRAE maintains numerous standards that are not incorporated by reference into any law or regulation.

4. As part of my job responsibilities, I am one of the ASHRAE employees who oversees ASHRAE's standards-development process, including as that process relates to Standard 90.1. ASHRAE has a prescribed development process that is used to develop new standards and maintain existing standards. The process is designed to ensure compliance with American National Standards Institute ("ANSI") requirements and broad participation from a variety of materially interested parties.

5. Many ASHRAE standards, including 90.1, have existed for years but are considered to be in "continuous maintenance," which means that the standard is updated continuously via addenda with supplements being published every 18 months and all addenda being incorporated for a new version every three years using the same development and editing process.

6. ASHRAE's Standard 90.1 is developed with input from a project committee, which consists of a group of experts in the field that include but not limited to utilities representatives, engineers, manufacturers, trade organizations and architects that volunteer their time to work on Standard 90.1. The project committee members are selected by the Chair of the project committee and approved by ASHRAE's Standards Committee and subcommittee based on expertise in the field and in order to ensure a balanced representation of different interest groups.

7. As with ASHRAE's other standards, the 90.1 project committee is subject to procedural oversight from ASHRAE's Board of Directors, Standards Committee, and Technology Council. Members of the public may also participate in creating the standard through submitting public comments that will be considered by the project committee.

8. Substantive drafting and changes to Standard 90.1 happen through a consensus of the project committee and involve input from the many participants in the development process. The standard is not simply the work of individual members. For each proposed change to a standard or any new language that will be added to a standard, the project committee must vote to approve the change. Voting on changes to the standard may occur at an in-person meeting following discussion on the issue, by letter ballot, or a combination of the two. For a change to be approved, a majority of project committee members must vote in the affirmative and a two-thirds majority of those actually casting votes on that particular change must vote in the affirmative. Whether at an in-person meeting, by letter ballot, or a combination thereof, committee members who submit negative votes are given the opportunity to provide written comments explaining their decision. If the vote passes with one or more negative votes, the results are held in abeyance until the comments are transmitted to all eligible voters and they are given an opportunity to change their votes. Similarly, the committee also votes on how to respond to public comments on all revisions and new drafts of Standard 90.1. In the event that responses don't resolve the commenters on public review drafts the committee members are given an opportunity again to change their vote prior to the changes being published or to decide to revise the change and conduct another public review.

9. For each ASHRAE standard, ASHRAE assigns one or more staff liaisons to work with that standard's project committee. These staff liaisons report to me. For Standard 90.1, the liaison is Steve Ferguson. Mr. Ferguson, who has an engineering degree and is knowledgeable concerning HVAC systems, has worked as the staff liaison for Standard 90.1 since February 2005.

10. The job responsibilities of an ASHRAE staff liaison include facilitating meetings of the project committee, including attending meetings, keeping minutes, processing voting ballots, and often recording proposed changes to the Standard that are under discussion. The staff liaisons

also work together with the project committees to craft the appropriate wording of the standards by reviewing all proposed changes and drafts of the standards to make sure they are written clearly, in the proper format, comply with ANSI and ASHRAE requirements, and are both technically and editorially consistent. For instance, when a change is made, the liaison might determine that language in another part of the standard also needs to be changed to make the standard internally consistent, at which point the liaison would submit an addenda back to the project committee for further consideration. For each standard, the staff liaison also provides the project committee with the comments and proposals submitted by the public and any materially affected parties and subsequently reviews the project committee's formal responses to public comments and proposals to make sure they are clearly worded and in a proper format.

11. Every three years, when ASHRAE performs a roll-up of all proposed changes and edits to a standard under continuous maintenance, like Standard 90.1, the staff liaison and other ASHRAE staff will work with certain members of the project committee to perform a final review and edit of the new version of each standard to make sure that all proposed changes have been properly incorporated. Additionally, members of ASHRAE's staff are responsible for reviewing and updating certain language in ASHRAE standards that does not relate to the technical requirements of the standard, including the initial policy statement and notice of instructions for submitting a proposed change.

12. In my experience, members of the project committee, other ASHRAE members, and members of the public who contribute to ASHRAE standards fully understand and intend that ASHRAE will own the copyrights in the completed ASHRAE standards.

13. Anyone who contributes to Standard 90.1 as a project committee member, or by submitting a change proposal or public comment, is required by ASHRAE to execute an Application for Membership on an ASHRAE Committee or a Form for Commenting on a Public

Review Draft ASHRAE Standard, both of which contain an acknowledgment stating “I understand that I acquire no rights in publication of such documents in which my contributions or other similar analogous form are used.” A true and correct copy of a sample Form for Commenting on a Public Review Draft ASHRAE Standard is attached hereto as Exhibit 1, and a true and correct copy of a sample Application for Membership on an ASHRAE Committee is attached as Exhibit 2. All forms signed by commenters or committee membership on the 2004, 2007, and 2010 versions of Standard 90.1 would have contained substantially the same language as these forms.

14. As a general matter, ASHRAE does not permit alterations to the forms that must be signed by public commenters or committee members, and I am not aware of any contribution made to ASHRAE Standards 90.1-2004, 90.1-2007, or 90.1-2010, for which the contributor altered a standard ASHRAE form or refused to execute the form. To the extent any comment has been submitted and considered by the project committee without a properly executed form, it would be an exception to the general practices and requirements imposed by ASHRAE.

15. ASHRAE has valid copyright registrations for the versions of Standard 90.1 at issue in this case (i.e., the 2004, 2007, and 2010 versions). True and correct copies of those registrations are attached hereto as Exhibits 3, 4, and 5. Additionally, on each version of ASHRAE 90.1, it is ASHRAE’s practice to place a copyright notice prominently on the standard to alert members of the public that ASHRAE has copyrighted the standard. Members of the project committee are also aware of this practice and are thus aware that ASHRAE copyrights its standards, including each successive version of Standard 90.1. ASHRAE is not aware of any member of the 90.1 project committee or member of the public who commented on 90.1 who has contested ASHRAE’s copyright rights in the standard or claimed an ownership interest in any part of ASHRAE 90.1.

16. In addition to its copyrights, ASHRAE also holds several registered trademarks, including U.S. Registration Nos. 1,503,000 and 4,262,297, which protect the following logos:



True and correct copies of ASHRAE's registrations for these two marks are attached as Exhibits 6 and 7. Additionally, for mark number 1,503,000, which has been used in commerce since 1959, ASHRAE has filed a Section 15 declaration in support of the incontestability of its registration. ASHRAE's use of these marks in connection with its standards and other goods and services has been substantially continuous, and these marks, which are routinely affixed to ASHRAE's standards, have become associated with ASHRAE and its standards. ASHRAE considers these marks to be valuable assets and has developed substantial goodwill associated with these marks over the years.

17. Each time new versions of ASHRAE standards are developed, ASHRAE offers those standards for sale. Sales of the standards are an important piece of ASHRAE's yearly revenues. The primary purchasers and users of ASHRAE's standards include builders, architects, and heating, air-conditioning, and refrigeration manufacturers who use the standards in their businesses.

18. ASHRAE's pricing and access policies are generally tailored to afford broad access to the standards. Prices typically range from \$25 to \$120, with no standard costing more than \$200. The standards are priced on the basis of ASHRAE's costs and ASHRAE does not charge more for standards that have been incorporated into laws or regulations. ASHRAE also offers discounts for libraries, educational uses, government entities, and individuals or entities who purchase the standards on a subscription basis.

19. To further ensure broader access to the standards, ASHRAE also offers online read-only access to many of its standards—particularly those standards that have been incorporated into codes—on the ASHRAE website, available at <https://www.ashrae.org/standards-research--technology/standards--guidelines/other-ashrae-standards-referenced-in-code>. This portion of the ASHRAE website allows viewers to read ASHRAE standards, including the 2004, 2007, and 2010 versions of Standard 90.1. For certain standards, including Standard 90.1, users of the ASHRAE website can even perform keyword searches within the read-only versions of the documents.

20. ASHRAE is unaware of anyone, except the defendant in this matter, who has complained that the various channels of access ASHRAE provides to Standard 90.1 are insufficient. Additionally, ASHRAE is aware that Defendant has recently removed ASHRAE Standards 90.1-2004, 90.1-2007, and 90.1-2010 from its site at the suggestion of the Court in this matter. Since that occurred, I am not aware of any complaints ASHRAE has received regarding a perceived loss of access to these standards.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed this 19<sup>th</sup> day of November, 2015 at Atlanta, Georgia.

  
Stephanie Reiniche

## EXHIBIT 3



This Certificate issued under the seal of the Copyright Office in accordance with title 17, United States Code, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

*Marybeth Peters*

Register of Copyrights, United States of America

**Form TX**  
For a Nondramatic Literary Work  
UNITED STATES COPYRIGHT OFFICE

TX 6-091-449



EFFECTIVE DATE OF REGISTRATION

Dec. 30 2004  
Month Day Year

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED MORE SPACE, USE A SEPARATE CONTINUATION SHEET.

1

**TITLE OF THIS WORK ▼**

ANSI/ASHRAE/IESNA Standard 90 1-2004, Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P Edition)

**PREVIOUS OR ALTERNATIVE TITLES ▼**

ANSI/ASHRAE/IESNA Standard 90 1-2001, Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P Edition)

**PUBLICATION AS A CONTRIBUTION** If this work was published as a contribution to a periodical, serial, or collection, give information about the collective work in which the contribution appeared **Title of Collective Work ▼**

If published in a periodical or serial give **Volume ▼** **Number ▼** **Issue Date ▼** **On Pages ▼**

2

**NAME OF AUTHOR ▼**

a American Society of Heating, Refrigerating & Air-Conditioning Engrs

Was this contribution to the work a work made for hire?

☒ Yes

☐ No

**AUTHOR'S NATIONALITY OR DOMICILE**

Name of Country

OR ☐ Citizen of

☐ Domiciled in U.S.A.

**DATES OF BIRTH AND DEATH**

Year Born ▼

Year Died ▼

**WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK**

Anonymous? ☐ Yes ☐ No

Pseudonymous? ☐ Yes ☐ No

If the answer to either of these questions is "Yes," see detailed instructions

**NOTE**

Under the law the "author" of a "work made for hire" is generally the employer, not the employee (see instructions). For any part of this work that was "made for hire" check "Yes" in the space provided, give the employer (or other person for whom the work was prepared) as "Author" of that part, and leave the space for dates of birth and death blank.

**NATURE OF AUTHORSHIP** Briefly describe nature of material created by this author in which copyright is claimed ▼  
Provide minimum requirements for energy-efficient design of bldgs except low-rise residential bldgs

**NAME OF AUTHOR ▼**

b

Was this contribution to the work a work made for hire?

☐ Yes

☐ No

**AUTHOR'S NATIONALITY OR DOMICILE**

Name of Country

OR ☐ Citizen of

☐ Domiciled in

**DATES OF BIRTH AND DEATH**

Year Born ▼

Year Died ▼

**WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK**

Anonymous? ☐ Yes ☐ No

Pseudonymous? ☐ Yes ☐ No

If the answer to either of these questions is "Yes," see detailed instructions

**NATURE OF AUTHORSHIP** Briefly describe nature of material created by this author in which copyright is claimed ▼

**NAME OF AUTHOR ▼**

c

Was this contribution to the work a work made for hire?

☐ Yes

☐ No

**AUTHOR'S NATIONALITY OR DOMICILE**

Name of Country

OR ☐ Citizen of

☐ Domiciled in

**DATES OF BIRTH AND DEATH**

Year Born ▼

Year Died ▼

**WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK**

Anonymous? ☐ Yes ☐ No

Pseudonymous? ☐ Yes ☐ No

If the answer to either of these questions is "Yes," see detailed instructions

**NATURE OF AUTHORSHIP** Briefly describe nature of material created by this author in which copyright is claimed ▼

3

**YEAR IN WHICH CREATION OF THIS WORK WAS COMPLETED** This information must be given in all cases  
2004

a

**DATE AND NATION OF FIRST PUBLICATION OF THIS PARTICULAR WORK**

Complete this information ONLY if this work has been published. Month ▶ December Day ▶ 21 Year ▶ 2004

b

U.S.A.

Nation

4

**COPYRIGHT CLAIMANT(S)** Name and address must be given even if the claimant is the same as the author given in space 2 ▼

American Society of Heating, Refrigerating & Air-Conditioning Engrs  
1791 Tullie Circle, NE  
Atlanta, GA 30329-2305

**TRANSFER** If the claimant(s) named here in space 4 is (are) different from the author(s) named in space 2, give a brief statement of how the claimant(s) obtained ownership of the copyright ▼

APPLICATION RECEIVED

DEC 30 2004

ONE DEPOSIT RECEIVED

TWO DEPOSITS RECEIVED

DEC 30 2004

FUNDS RECEIVED

DO NOT WRITE HERE  
OFFICE USE ONLY

**MORE ON BACK ▶** • Complete all applicable spaces (numbers 5-9) on the reverse side of this page  
• See detailed instructions • Sign the form at line 8

**DO NOT WRITE HERE**  
Page 1 of 2 pages

JA388

ASHRAE0001596

RECEIVED  
FEB 25 2005  
SPECIAL PUBS

EXAMINED BY HM FORM TX  
CHECKED BY \_\_\_\_\_  
CORRESPONDENCE  
☐ Yes  
FOR  
COPYRIGHT  
OFFICE  
USE  
ONLY

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED MORE SPACE, USE A SEPARATE CONTINUATION SHEET

PREVIOUS REGISTRATION Has registration for this work, or for an earlier version of this work, already been made in the Copyright Office?

☒ Yes ☐ No If your answer is "Yes," why is another registration being sought? (Check appropriate box) ▼

a ☐ This is the first published edition of a work previously registered in unpublished form

b ☐ This is the first application submitted by this author as copyright claimant

c ☒ This is a changed version of the work, as shown by space 6 on this application

If your answer is "Yes," give Previous Registration Number ▶ TX 5-662-106

Year of Registration ▶ 2001

5

DERIVATIVE WORK OR COMPILATION

Preexisting Material Identify any preexisting work or works that this work is based on or incorporates ▼

Derivative Work Previously published material

a 6

Material Added to This Work Give a brief, general statement of the material that has been added to this work and in which copyright is claimed ▼

Editorial revisions and additional material

b See instructions  
before completing  
this space

DEPOSIT ACCOUNT If the registration fee is to be charged to a Deposit Account established in the Copyright Office, give name and number of Account  
Name ▼ Account Number ▼

ASHRAE

DA 019739

a 7

CORRESPONDENCE Give name and address to which correspondence about this application should be sent Name / Address / Apt / City / State / ZIP ▼

ASHRAE, ATTN Mildred Geshwiler  
1791 Tullie Circle, NE  
Atlanta, GA 30329-2305

b

Area code and daytime telephone number ▶ (678) 539-1154

Fax number ▶ (678) 539-2191

Email ▶ mgeshwiler@ashrae.org

CERTIFICATION \* I, the undersigned, hereby certify that I am the

Check only one ▶

☐ author

☐ other copyright claimant

☐ owner of exclusive right(s)

☒ authorized agent of

ASHRAE

Name of author or other copyright claimant, or owner of exclusive right(s) ▲

of the work identified in this application and that the statements made  
by me in this application are correct to the best of my knowledge

8

Typed or printed name and date ▼ If this application gives a date of publication in space 3, do not sign and submit it before that date

Mildred Geshwiler

Date ▶ December 28, 2004

Handwritten signature (X) ▼

x *Mildred Geshwiler*

Certificate  
will be  
mailed in  
window  
envelope  
to this  
address

Name ▼

ASHRAE, ATTN MILDRED GESHWILER

Number/Street/Apt ▼

1791 TULLIE CIRCLE, NE

City/State/ZIP ▼

ATLANTA, GA 30329-2305

• Complete all necessary spaces  
• Sign your application in space 9

1 Application form  
2 Nonrefundable filing fee in check or money  
order payable to Register of Copyrights  
3 Deposit material

Library of Congress  
Copyright Office TX  
101 Independence Avenue S.E.  
Washington D.C. 20559-6222

Form is subject to  
change. For current  
fees, check the  
Copyright Office  
website at  
www.copyright.gov  
or write the Copyright  
Office at said  
(800) 771 5000

9

\*17 USC § 506(a) Any person who knowingly makes a false representation of a material fact in the application for copyright registration provided for by section 408 or in any written statement filed in connection with the application, shall be fined not more than \$2 500

## EXHIBIT 4



This Certificate issued under the seal of the Copyright Office in accordance with title 17, United States Code, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

*Marybeth Peters*

Register of Copyrights, United States of America

**RECEIVED**

JUN 18 2008

SPECIAL PUBS

Registration Number:

**TX 6-842-936**

Effective date of  
registration:

February 29, 2008

**Title**

**Title of Work:** ANSI/ASHRAE/IESNA Standard 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P)

**Previous or Alternative Title:** ANSI/ASHRAE/IESNA Standard 90.1-2004, Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P)

**Completion/ Publication**

**Year of Completion:** 2008

**Date of 1st Publication:** January 9, 2008

**Nation of 1st Publication:** United States

**Author**

**Author:** American Society of Heating, Refrigerating & Air-Conditioning Engrs

**Author Created:** Text and illustrations.

**Work made for hire:** Yes

**Domiciled in:** United States

**Copyright claimant**

**Copyright Claimant:** American Society of Heating, Refrigerating & Air-Conditioning Engrs  
1791 Tullie Circle, NE, Atlanta, GA, 30329-2305

**Limitation of copyright claim**

**Material excluded from this claim:** Derivative work, previously published material.

**Previously registered:** Yes

**Previous registration and year:** TX 6-091-449 2004

**Basis of current registration:** This is a changed version of the work.

**New material included in claim:** Editorial revisions and additional material.

**Certification**

Name: Christina Helms

Date: February 19, 2008

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## EXHIBIT 5



This Certificate issued under the seal of the Copyright Office in accordance with title 17, *United States Code*, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

*Maria A. Pallante*

Acting Register of Copyrights, United States of America

Registration Number  
**TX 7-299-602**

Effective date of  
registration:

December 13, 2010

**RECEIVED**

MAR 07 2011

SPECIAL PUBS

**Title**

Title of Work: ANSI/ASHRAE/IES Standard 90.1-2010, Energy Standard for Buildings Except Low-Rise Residential Buildings (IP)

**Completion/Publication**

Year of Completion: 2010

Date of 1st Publication: November 23, 2010

Nation of 1st Publication: United States

International Standard Number: ISSN 1041-2336

**Author**

■ Author: American Society of Heating Refrigerating and Air-Conditioning Engineers Inc., dba ASHRAE  
Author Created: text, editing, illustrations

Work made for hire: Yes

Citizen of: United States

Domiciled in: United States

**Copyright claimant**

Copyright Claimant: American Society of Heating Refrigerating and Air-Conditioning Engineers Inc., dba ASHRAE  
1791 Tullie Circle, NE, Atlanta, GA, 30329-2305

**Limitation of copyright claim**

Material excluded from this claim: text, illustrations

Previous registration and year: TX 6-842-936 2008

TX 6-091449 2004

New material included in claim: text, editing

**Rights and Permissions**

Organization Name: American Society of Heating Refrigerating and Air-Conditioning Engineers Inc.  
Name: Steve Comstock

Email: scomstock@ashrae.org

Telephone: 678-539-1102

Address: 1791 Tullie Circle, NE  
Atlanta, GA 30329-2305

**Certification**

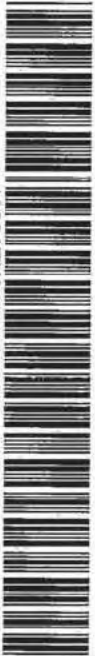
---

**Name:** Michshell Phillips

**Date:** December 9, 2010

**Applicant's Tracking Number:** 0201796533357958

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**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

|  |                                   |
|--|-----------------------------------|
| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
|--|-----------------------------------|

**DECLARATION OF JAMES THOMAS**

Pursuant to 28 U.S.C. § 1746, I, James Thomas, declare the following statements to be true under the penalties of perjury:

1. I am over the age of 18 years and am fully competent to testify to the matters stated in this Declaration.
2. This declaration is based on my personal knowledge. If called to do so, I would and could testify to the matters stated herein.
3. I am the President of ASTM International ("ASTM"), which is a not-for-profit organization headquartered in Pennsylvania. I have worked at ASTM since 1972.
4. ASTM was founded in 1898 when a group of railroad experts and engineers got together to respond to technical issues that had been identified in the early days of the railroad industry. The very first ASTM standard, standard A1, provided uniform specifications for

carbon steel rails. This made it possible for manufacturers from different parts of the country to produce uniform rails that could be used in a national railroad.

5. ASTM's activities have expanded over the past one hundred years and ASTM now develops standards that are used in a wide range of fields, including consumer products, iron and steel products, rubber, paints, plastics, textiles, medical services and devices, electronics, construction, energy, water, and petroleum products.

6. The term "standards" refers to a variety of technical works, including works that contain product specifications, installation methods, methods for manufacturing or testing materials, recommended practices to ensure safety or efficiency, or other guidelines or best practices.

7. An organization that develops standards is a "standards development organization" or "SDO."

8. In the United States, standards are typically developed by private organizations that have technical expertise in the relevant area.

9. Standards are usually highly technical and specialized, and are written for audiences that have particular expertise in the relevant fields.

10. Standards are used by industry actors as a form of self-regulation and as a source of best practices.

11. ASTM's mission is to be recognized as the premier developer and provider of voluntary consensus standards, related technical information and services that promote public health and safety, support the protection and sustainability of the environment, and improve the overall quality of life; contribute to the reliability of materials, products, systems and services; and facilitate international, regional, and national commerce.

12. ASTM develops voluntary consensus standards and is accredited by the American National Standards Institute.

13. ASTM standards are developed based on public demands, industry needs, and public safety concerns and advancements in technology. They address a technical issue or problem identified by a group of people in the relevant sector that can be addressed with a standard-based solution.

14. ASTM's standards are used by scientists and engineers in their laboratories, by architects and designers in their plans, and by industry in their business contracts.

15. On occasion, government agencies incorporate ASTM's standards by reference into regulations. Approximately 10 percent of ASTM's standards are incorporated by reference into federal regulations.

16. ASTM standards are not developed for the purpose of being incorporated into regulations.

17. When it develops a new standard, ASTM does not know whether the standard will be incorporated by reference into government regulations.

18. ASTM does not lobby government agencies to reference its standards.

19. Membership in ASTM costs \$75 per year for an individual member and \$400 per year for an organizational member. Each member receives one free volume of the Annual Book of ASTM Standards as well as other membership benefits.

20. ASTM has kept its membership fees at \$75 for over fifteen years to permit the widest participation possible in the standard development process, so as to prevent its standards from being biased toward the interests of only stakeholders who can afford to pay higher membership fees. ASTM's membership fees have never exceeded \$75.

21. ASTM has over 140 technical committees made up of over 23,000 technical members representing producers, users, consumers, government, and academia from more than 150 countries.

22. Each technical committee contains a balanced voting membership, including industry representatives, government representatives, consumers, people with particular expertise in the subject matter, and others.

23. Throughout the standards development process, ASTM and its committees make it clear that all participants' contributions to any particular standard will be merged into a unitary standard.

24. ASTM's standard development process begins with an individual registering a "work item," which describes the idea for a new standard that will be published and owned by ASTM, or moving to draft a new standard at a subcommittee meeting.

25. The chair of the relevant subcommittee then reviews the work item request and considers, among other things, whether there is a need for the proposed standard and whether there will be sufficient interest from a balanced group necessary to develop the standard. If the chair approves the work item or if the subcommittee approves the motion for a new standard, a task group will develop a draft of the standard.

26. The technical contact is the leader of the task group.

27. The draft standard is then edited by an ASTM staff member, who also adds certain language and components that are required by the ASTM form and style guide.

28. The draft standard is then voted on by first the entire subcommittee, followed by the entire main committee and the complete Society, and reviewed by the Committee on Standards to ensure that all procedures were followed.

29. Technical committees make decisions about the appropriate content of the standards, including the relevant measurements, values, descriptions, and other specifications, as well as the language with which to express these standards.

30. There are other standard developing organizations that create standards that cover the same or similar subject matter as the standards developed by ASTM, including, for example, the International Organization for Standards, SAE International, and the American Association of State Highway and Transportation Officials. The content and language of these SDO's standards differs from the content of the corresponding ASTM standards.

31. At each level of balloting, voters can suggest edits or provide comments. Each negative vote must be addressed to determine if it is persuasive. At least 66.7% of the voting subcommittee members and 90% of the voting main committee members must approve all standard actions, with not less than 60% of the voting members returning ballots.

32. ASTM has developed over 12,000 standards.

33. All ASTM standards are required to be reviewed on a 5 year schedule and each standard is either reapproved, revised or withdrawn. It takes approximately 8-12 months to complete a revision cycle.

34. ASTM incurs substantial costs for its standards development infrastructure and delivery platforms, including the resources it provides to encourage collaboration among members; expenses relating to technical committee meetings and balloting as the standards make their way through the development process; and editing, producing, distributing and promoting the completed standards.

35. In 2014, ASTM spent more than \$9 million to cover the cost of technical committee operations and \$19 million for publication of copyrighted materials.

36. ASTM develops its standards with the understanding that the standards will be protected by copyright, which provides ASTM with the exclusive right to sell, reproduce, display and create derivative works based on the standards.

37. ASTM depends on the revenue it generates from sales of its copyrighted materials to conduct its operations and requires that revenue to be in a position to continue to develop its standards in the manner in which it currently operates.

38. ASTM generates over two-thirds of its revenue from the sale of copyrighted materials.

39. ASTM has devoted substantial efforts to develop and promote the sale of products and services that are related or complementary to ASTM's standards. ASTM does not generate substantial income from these goods and services.

40. ASTM generated a net loss of \$3 million in 2014 for non-standards related products and services.

41. ASTM's copyrighted materials give ASTM a competitive advantage in selling ancillary or complementary products and services. ASTM can include copies of its standards as part of a package it provides to customers in training or certification programs.

42. ASTM does not consider the likelihood and extent to which a standard will generate revenues when deciding whether to develop or maintain a standard.

43. Sales of a limited number of standards drive the bulk of ASTM's revenues. Because of their relevance to smaller market audiences, many ASTM standards generate very limited revenues, which do not cover the costs of the development process. The sales of the best-selling standards effectively subsidize the creation and maintenance of the remaining standards.

44. ASTM publishes its standards in hard copy and digital formats, including pdfs, html and xml formats, which can be purchased from ASTM or its authorized resellers.

45. When purchased individually, the price per ASTM standard is \$38-\$89.

46. The price of each ASTM new individual standard is calculated based on the number of pages in the standard.

47. ASTM does not seek to obtain higher prices for standards that have been incorporated by reference.

48. ASTM provides copies of its standards at a reduced cost or at no cost when it is informed that the regular cost is a burden to the requester.

49. For example, ASTM has a "10 Standards for Students" program through which professors can select any 10 ASTM standards and students can purchase a packet containing all 10 standards for just \$10 per student.

50. ASTM provides the public with free, read-only access to all ASTM standards that ASTM is aware have been incorporated by reference into federal regulations.

51. ASTM identifies standards that have been incorporated by reference into federal regulations from the database created by the National Institute of Standards and Technology.

52. ASTM publicizes the free read-only access provided on its website.

53. During the notice and comment period regarding proposed federal regulations, upon request by the relevant federal agency, ASTM provides free, read-only access to standards that are incorporated by reference in proposed regulations.

54. ASTM has not received any complaints about lack of accessibility of its standards other than from Defendant.

Dated: November 18, 2015

  
James Thomas

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA**

|  |                                   |
|--|-----------------------------------|
| <p>AMERICAN SOCIETY FOR TESTING<br/>AND MATERIALS d/b/a/ ASTM<br/>INTERNATIONAL;</p> <p>NATIONAL FIRE PROTECTION<br/>ASSOCIATION, INC.; and</p> <p>AMERICAN SOCIETY OF HEATING,<br/>REFRIGERATING, AND AIR<br/>CONDITIONING ENGINEERS,</p> <p>Plaintiffs/<br/>Counter-Defendants,</p> <p>v.</p> <p>PUBLIC.RESOURCE.ORG, INC.,</p> <p>Defendant/<br/>Counter-Plaintiff.</p> | <p>Case No. 1:13-cv-01215-TSC</p> |
|--|-----------------------------------|

**DECLARATION OF JORDANA S. RUBEL**

Pursuant to 28 U.S.C. § 1746, I, Jordana S. Rubel, declare the following statements to be true under the penalties of perjury:

1. I am over the age of 18 years and am fully competent to testify to the matters stated in this Declaration.
2. This declaration is based on my personal knowledge. If called to do so, I would and could testify to the matters stated herein.
3. I am an associate at Morgan Lewis & Bockius LLP, which represents Plaintiff American Society for Testing and Materials in this matter.
4. Attached as Exhibit 1 is a true and correct copy of the Expert Report of John C. Jarosz that was served on June 5, 2015.

5. Attached as Exhibit 2 are true and correct copies of excerpts of the transcript of the 30(b)(6) deposition of Public.Resource.Org, Inc., which took place on February 26, 2015.

6. Attached as Exhibit 3 are true and correct copies of excerpts of the transcript of the deposition of Carl Malamud, which took place on February 27, 2015.

7. Attached as Exhibit 4 are true and correct copies of excerpts of the transcript of the 30(b)(6) deposition of Point.B Studio, which took place on November 13, 2014.

8. Attached as Exhibit 5 are true and correct copies of excerpts of the transcript of the 30(b)(6) deposition of HTC Global, Inc., which took place on November 5, 2014.

9. Attached as Exhibit 6 are true and correct copies of excerpts of the transcript of the 30(b)(6) deposition of Christian Dubay on behalf of the National Fire Protection Association, Inc., which took place on April 1, 2015.

10. Attached as Exhibit 7 are true and correct copies of excerpts of the transcript of the 30(b)(6) deposition of Stephanie Reiniche on behalf of the American Society for Heating, Refrigerating and Air Conditioning Engineers, which took place on March 30, 2015.

11. Attached as Exhibit 8 are true and correct copies of excerpts of the transcript of the 30(b)(6) deposition of Steven Comstock on behalf of the American Society for Heating, Refrigerating and Air Conditioning Engineers, which took place on March 5, 2015.

12. Public.Resource.Org, Inc. ("Defendant") submitted Freedom of Information Act ("FOIA") requests to a number of executive agencies requesting copies of standards that are incorporated by reference in federal regulations. Attached as Exhibit 9 are true and correct copies of letters of requests Public.Resource.Org, Inc. submitted to the U.S. Department of Housing and Urban Develop and the U.S. Consumer Product Safety Commission that were downloaded from Defendant's website.

13. No agency has provided Defendant with copies of the standards it has requested through these FOIA requests. Numerous federal agencies have explicitly taken the position in communications with Defendant that incorporation by reference of materials into regulations does not destroy the copyright in those materials. Attached as Exhibit 10 are true and correct copies of letters to Defendant from the U.S. Department of Interior, the U.S. Department of Housing and Urban Development and the U.S. Consumer Product Safety Commission that were downloaded from Defendant's website.

14. Attached as Exhibit 11 are true and correct copies of excerpts from Defendant's responses to interrogatories served by American Society for Testing and Materials. Defendant did not serve supplemented responses to these interrogatories.

15. Copies of 43 of Defendant's versions of ASTM's standards at issue, with Defendant's cover page, were uploaded by "dharlanuctcom" onto the Scribd platform. See <https://www.scribd.com/dharlanuctcom>. Attached as Exhibit 12 is a true and correct copy of a printout of a page showing uploads made by dharlanuctcom to the Scribd platform.

16. Even after Mr. Malamud was notified of specific errors in Defendant's versions of Plaintiffs' standards that were posted on Defendant's website, Defendant did not correct those mistakes and maintained versions of the standards that contained these errors on its website until it removed its copies of Plaintiffs' standards in November 2015 at the Court's suggestion.

17. Attached as Exhibit 13 is a true and correct copy of Exhibit 55 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

18. Attached as Exhibit 14 is a true and correct copy of Exhibit 33 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

19. Attached as Exhibit 15 is a true and correct copy of Exhibit 69 to the deposition of Carl Malamud.

20. Attached as Exhibit 16 is a true and correct copy of Exhibit 63 to the deposition of Carl Malamud.

21. Attached as Exhibit 17 is a true and correct copy of Exhibit 2 to the 30(b)(6) deposition of HTC Global.

22. Attached as Exhibit 18 is a true and correct copy of excerpts from the expert deposition of James Fruchterman, which took place on July 31, 2015.

23. Attached as Exhibit 19 is a true and correct copy of Exhibit 21 to the 30(b)(6) deposition of Point.B Studio.

24. Attached as Exhibit 20 is a true and correct copy of Exhibit 57 to the deposition of Carl Malamud.

25. Attached as Exhibit 21 is a true and correct copy of Exhibit 62 to the deposition of Carl Malamud.

26. Attached as Exhibit 22 is a true and correct copy of Exhibit 18 to the 30(b)(6) deposition of Point.B Studio.

27. Attached as Exhibit 23 are true and correct copies of Exhibits 52 and 53 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

28. Attached as Exhibit 24 is a true and correct copy of Exhibit 75 to the deposition of Carl Malamud.

29. Attached as Exhibit 25 are true and correct copies of documents Bates stamped PRO\_00082474, PRO\_00082837, and PRO\_00083112, which were produced by Public.Resource.Org, Inc.

30. Attached as Exhibit 26 is a true and correct copy of a document Bates stamped PRO\_00101955-57, which was produced by Public.Resource.Org, Inc.

31. Attached as Exhibit 27 is a true and correct copy of Exhibit 38 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

32. Attached as Exhibit 28 is a true and correct copy of Exhibit 40 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

33. Attached as Exhibit 29 is a true and correct copy of Exhibit 64 to the deposition of Carl Malamud.

34. Attached as Exhibit 30 is a true and correct copy of Exhibit 58 to the deposition of Carl Malamud.

35. Attached as Exhibit 31 is a true and correct copy of Exhibit 59 to the deposition of Carl Malamud.

36. Attached as Exhibit 32 is a true and correct copy of a document I downloaded from the law.resource.org website on November 19, 2015.

37. Attached as Exhibit 33 is a true and correct copy of Exhibit 77 to the deposition of Carl Malamud.

38. Attached as Exhibit 34 is a true and correct copy of Exhibit 65 to the deposition of Carl Malamud.

39. Attached as Exhibit 35 is a true and correct copy of Exhibit 27 to the 30(b)(6) deposition of Point.B Studio.

40. Attached as Exhibit 36 is a true and correct copy of Exhibit 73 to the deposition of Carl Malamud.

41. Attached as Exhibit 37 is a true and correct copy of Exhibit 49 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

42. Attached as Exhibit 38 is a true and correct copy of Exhibit 43 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

43. Attached as Exhibit 39 is a true and correct copy of Exhibit 51 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

44. Attached as Exhibit 40 is a true and correct copy of Exhibit 44 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

45. Attached as Exhibit 41 is a true and correct copy of Exhibit 54 to the 30(b)(6) deposition of Public.Resource.Org, Inc.


46. Attached as Exhibit 42 is a true and correct copy of Exhibit 56 to the 30(b)(6) deposition of Public.Resource.Org, Inc.

47. Attached as Exhibit 43 is a true and correct copy of Exhibit 76 to the deposition of Carl Malamud.

48. Attached as Exhibit 44 is a true and correct copy of Exhibit 70 to the deposition of Carl Malamud.

49. Attached as Exhibit 45 are true and correct copies of excerpts of the transcript of the 30(b)(6) deposition of Bruce Mullen on behalf of on the American Society for Heating, Refrigerating and Air Conditioning Engineers, which took place on March 31, 2015.

Dated: November 19, 2015

  
Jordana S. Rubel

**MATERIAL UNDER SEAL DELETED**

**JA409-JA523**

# EXHIBIT 2

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR TESTING AND  
MATERIALS D/B/A ASTM INTERNATIONAL;  
NATIONAL FIRE PROTECTION, INC.;  
AND AMERICAN SOCIETY OF HEATING,  
REFRIGERATING, AND AIR-CONDITIONING  
ENGINEERS, INC.

Plaintiffs, /  
Counter-Defendants, Case No.:

vs. 1:13-cv-01215-EGS

PUBLIC.RESOURCE.ORG, INC.

Defendant/  
Counter-Plaintiff /

VIDEOTAPED DEPOSITION OF THE 30 b) 6) OF  
PUBLIC.RESOURCE.ORG

DATE: Thursday, February 26, 2015

TIME: 10:07

LOCATION: 1 Market Street, Spear Tower, Suite  
2000, San Francisco, California

Reported by: Ashley Soevyn  
Certified Shorthand Reporter  
License Number 12019

23

1 Resource? 10:23:05AM  
2 A I am. 10:23:06AM  
3 Q What is your position at Public Resource 10:23:08AM  
4 at this time? 10:23:10AM  
5 A I'm the president and founder. 10:23:11AM  
6 Q Has that been your title ever since you 10:23:14AM  
7 founded Public Resource? 10:23:16AM  
8 A Yes. 10:23:18AM  
9 Q Is that a full-time position? 10:23:20AM  
10 A It is. 10:23:24AM  
11 Q Do you do any other work that leads to any 10:23:26AM  
12 sort of compensation other than your work for Public 10:23:30AM  
13 Resource at this time? 10:23:32AM  
14 A I do not. 10:23:34AM  
15 Q As the president and founder of Public 10:23:37AM  
16 Resource, what are your job responsibilities? 10:23:39AM  
17 MR. BRIDGES: Objection, vague and 10:23:46AM  
18 ambiguous. 10:23:46AM  
19 THE WITNESS: I run the corporation. 10:23:51AM  
20 BY MR. FEE: 10:23:53AM  
21 Q Okay. Can you be any more specific than 10:23:53AM  
22 that? 10:23:59AM  
23 MR. BRIDGES: Same objection. 10:24:00AM  
24 THE WITNESS: I speak. I program. I run 10:24:03AM  
25 computers. 10:24:06AM

24

1 BY MR. FEE: 10:24:07AM

2 Q What is Public Resource? 10:24:09AM

3 MR. BRIDGES: Objection, vague and 10:24:12AM

4 ambiguous. 10:24:13AM

5 THE WITNESS: A 501(c)(3) nonprofit 10:24:14AM

6 corporation. 10:24:19AM

7 BY MR. FEE: 10:24:20AM

8 Q What products or services does Public 10:24:20AM

9 Resource provide? 10:24:22AM

10 MR. BRIDGES: Objection, vague and 10:24:23AM

11 ambiguous, argumentative. 10:24:25AM

12 THE WITNESS: We make government 10:24:31AM

13 information more broadly available to inform 10:24:32AM

14 citizens. 10:24:35AM

15 BY MR. FEE: 10:24:35AM

16 Q How does Public Resource do that? 10:24:39AM

17 A I'm sorry? 10:24:42AM

18 Q How does Public Resource do that? 10:24:43AM

19 A We use the Internet. 10:24:46AM

20 Q At this point in time, do you own any 10:25:03AM

21 controlling interest in the corporation, or do you 10:25:07AM

22 hold any positions for any nonprofit organizations 10:25:09AM

23 other than Public Resource? 10:25:13AM

24 MR. BRIDGES: Objection, compound. 10:25:15AM

25 MR. FEE: It is compound. I'll break that 10:25:17AM

25

1 down. Let me re-ask that. 10:25:19AM

2 BY MR. FEE: 10:25:21AM

3 Q First of all, do you own a controlling 10:25:21AM

4 interest in any corporation putting aside what you 10:25:23AM

5 do for Public Resource? 10:25:27AM

6 A No, I do not. 10:25:29AM

7 Q Do you have a role in connection with any 10:25:31AM

8 nonprofit organization other than Public Resource 10:25:34AM

9 at -- 10:25:38AM

10 MR. BRIDGES: Objection, vague and 10:25:38AM

11 ambiguous. 10:25:39AM

12 BY MR. FEE: 10:25:39AM

13 Q -- at this time? 10:25:40AM

14 MR. BRIDGES: Objection, vague and 10:25:40AM

15 ambiguous. 10:25:40AM

16 THE WITNESS: I'm on the board of 10:25:41AM

17 directors of Common Crawl, a 501(c)(3) nonprofit 10:25:42AM

18 corporation. 10:25:46AM

19 BY MR. FEE: 10:25:48AM

20 Q Any others? 10:25:49AM

21 A No, sir. 10:25:51AM

22 MR. BRIDGES: Just leave me time to 10:25:52AM

23 object. I should have objected to that one. 10:25:52AM

24 BY MR. FEE: 10:25:56AM

25 Q What is Common Crawl? 10:25:56AM

30

1 THE WITNESS: And -- and manage those 10:31:03AM

2 objects, yes. 10:31:03AM

3 BY MR. FEE: 10:31:04AM

4 Q Can you explain to me what the basis is 10:31:05AM

5 for that belief? 10:31:08AM

6 A Well, there are a large number of 10:31:11AM

7 collections on the Internet Archive, such as the 10:31:13AM

8 Grateful Dead Archive, for example. 10:31:16AM

9 Q Has Public.Resource.Org ever posted any 10:31:20AM

10 materials to the Internet Archive? 10:31:24AM

11 A Yes. 10:31:26AM

12 Q Does Public Resource have any employees 10:31:37AM

13 besides yourself? 10:31:39AM

14 A No. 10:31:41AM

15 Q Since its found -- founding, did Public 10:31:43AM

16 Resource have any employees other than yourself? 10:31:46AM

17 A Yes, I had one employee. 10:31:51AM

18 Q Who is that? 10:31:53AM

19 A Joel Hardi, H-A-R-D-I. 10:31:54AM

20 Q What was Joel Hardi's role at Public 10:32:00AM

21 Resource while he was there? 10:32:03AM

22 A He was a systems administrator and 10:32:05AM

23 programmer. 10:32:09AM

24 Q During what time frame did Mr. Hardi work 10:32:13AM

25 at Public Resource? 10:32:15AM

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1 A No, that was it. 11:07:41AM

2 Oh, I'm sorry. I got e-mail from 11:08:10AM

3 Mr. Cooper at ANSI as well. 11:08:13AM

4 Q Do you recall the substance of that 11:08:16AM

5 e-mail? 11:08:18AM

6 A I think he liked the packaging. 11:08:18AM

7 THE REPORTER: You said that he's from 11:08:24AM

8 ANSI? 11:08:24AM

9 THE WITNESS: A-N-S-I, American National 11:08:24AM

10 Standards Institution -- or Institute. 11:08:30AM

11 BY MR. FEE: 11:08:34AM

12 Q When you were purchasing the 73 standards, 11:08:35AM

13 why did you decide to buy paper copies as opposed to 11:08:38AM

14 electronic copies? 11:08:41AM

15 MR. BRIDGES: Objection, vague, ambiguous, 11:08:43AM

16 relevance. 11:08:44AM

17 THE WITNESS: It's by far the easiest way 11:08:45AM

18 to process them. 11:08:48AM

19 BY MR. FEE: 11:08:49AM

20 Q Can you explain why it would be easier to 11:08:50AM

21 process paper documents than to, for example, print 11:08:53AM

22 electronic copies? 11:08:56AM

23 A A paper document you throw it on a scanner 11:08:57AM

24 and you scan it. 11:09:01AM

25 Q So you take the paper and make an 11:09:02AM

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1 electronic copy as opposed to just having the 11:09:05AM

2 electronic copy? 11:09:08AM

3 MR. BRIDGES: I'll object -- I object. 11:09:09AM

4 Argumentative terminology, vague and ambiguous. 11:09:10AM

5 THE WITNESS: Yes, you scan it and make an 11:09:12AM

6 electronic copy. 11:09:14AM

7 BY MR. FEE: 11:09:15AM

8 Q So wouldn't it have been easier to 11:09:16AM

9 purchase electronic copies from the standards 11:09:19AM

10 organizations? 11:09:21AM

11 MR. BRIDGES: Objection, lacks foundation, 11:09:22AM

12 vague and ambiguous, argumentative. 11:09:23AM

13 THE WITNESS: No, it wouldn't be. 11:09:26AM

14 BY MR. FEE: 11:09:28AM

15 Q And your decision to buy paper copies as 11:09:28AM

16 opposed to electronic copies was not in order to 11:09:32AM

17 avoid any terms of use in connection with a license 11:09:34AM

18 agreement of an electronic copy? 11:09:39AM

19 MR. BRIDGES: Objection, lacks foundation, 11:09:41AM

20 vague and ambiguous. 11:09:42AM

21 THE WITNESS: Both terms of use and the 11:09:43AM

22 way a PDF document are packaged make them much 11:09:47AM

23 harder to work with. 11:09:53AM

24 BY MR. FEE: 11:09:54AM

25 Q If you had purchased an electronic copy of 11:09:55AM

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1 in many news media reports, for example. 11:29:55AM

2 BY MR. FEE: 11:29:58AM

3 Q Are you aware of any individuals who 11:29:58AM

4 actually had a problem accessing one of the 11:30:00AM

5 plaintiffs' standards and -- and that were governed 11:30:03AM

6 by those standards via incorporation by reference? 11:30:06AM

7 MR. BRIDGES: All the same objections as I 11:30:13AM

8 last said. 11:30:14AM

9 THE WITNESS: Yes, I am. 11:30:15AM

10 BY MR. FEE: 11:30:16AM

11 Q Identify all those for me. 11:30:16AM

12 A I don't know if I can identify all of 11:30:17AM

13 them, but can -- can I -- 11:30:19AM

14 Q Identify all that you can think of sitting 11:30:21AM

15 here right now. 11:30:23AM

16 A Okay. Mr. Carl Weimer is the executive 11:30:24AM

17 director of the Pipeline Safety Trust. 11:30:29AM

18 MR. BRIDGES: You've been asked to 11:30:35AM

19 identify the individuals. That's what he's asked 11:30:35AM

20 you to do. 11:30:39AM

21 BY MR. FEE: 11:30:41AM

22 Q Who else. 11:30:41AM

23 A There were a large number of submissions 11:30:46AM

24 to federal information gathering that included 11:30:52AM

25 submissions by groups that complained about lack of 11:31:01AM

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1 access. 11:31:06AM  
2 Q Any others that you can identify? 11:31:07AM  
3 MR. BRIDGES: Same -- same objections as 11:31:10AM  
4 to my earlier -- as -- as my earlier objections. 11:31:12AM  
5 THE WITNESS: Again, in the dockets there 11:31:16AM  
6 were a large number of groups that identified 11:31:18AM  
7 access problems. 11:31:22AM  
8 BY MR. FEE: 11:31:22AM  
9 Q But the only individual that you've 11:31:23AM  
10 identified is Carl Weimer; is that right? 11:31:25AM  
11 A That I -- 11:31:27AM  
12 MR. BRIDGES: Same -- same objections as 11:31:30AM  
13 my earlier ones. 11:31:31AM  
14 THE WITNESS: The only one identified by 11:31:33AM  
15 name, yes. 11:31:34AM  
16 BY MR. FEE: 11:31:34AM  
17 Q And Mr. Weimer, as you said, was the 11:31:35AM  
18 executive director of Pipeline Safety Trust; is that 11:31:35AM  
19 right? 11:31:39AM  
20 A Yes. 11:31:40AM  
21 Q And what did he tell you about his 11:31:41AM  
22 inability to access one of the plaintiffs' 11:31:43AM  
23 standards? 11:31:45AM  
24 MR. BRIDGES: Objection, lacks foundation, 11:31:46AM  
25 vague and ambiguous. 11:31:47AM

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1 THE WITNESS: He spoke at a information 11:31:52AM  
2 gathering process at PHMSA, P-H-M-S-A, which is a 11:31:54AM  
3 federal government agency. 11:32:05AM

4 MR. BRIDGES: I'll ask the witness to 11:32:07AM  
5 listen to the question and to answer the question. 11:32:08AM

6 THE WITNESS: Okay. 11:32:10AM

7 BY MR. FEE: 11:32:11AM

8 Q So what did Mr. Weimer say about his 11:32:15AM  
9 inability to access plaintiffs' standards? 11:32:18AM

10 MR. BRIDGES: Objection, lacks foundation, 11:32:24AM  
11 vague and ambiguous. 11:32:25AM

12 THE WITNESS: He said that lack of 11:32:27AM  
13 availability of the standards was a significant 11:32:27AM  
14 issue for him. 11:32:33AM

15 MR. FEE: Did he identify the lack of 11:32:34AM  
16 availability of one of the plaintiffs' standards in 11:32:37AM  
17 particular? 11:32:41AM

18 A I don't recall. 11:32:42AM

19 Q Did he explain to you or to -- this is a 11:32:42AM  
20 group speech he made; is that what you said? He 11:32:44AM  
21 made a presentation? 11:32:46AM

22 MR. BRIDGES: Objection, compound, vague 11:32:47AM  
23 and ambiguous. 11:32:49AM

24 THE WITNESS: It was testimony before a 11:32:50AM  
25 federal proceeding. 11:32:52AM

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1 BY MR. FEE: 11:32:53AM

2 Q During his testimony did Mr. Weimer 11:32:54AM

3 explain why he was unable to access any standards 11:32:57AM

4 through reading rooms who were purchasing copies of 11:33:00AM

5 those standards? 11:33:04AM

6 MR. BRIDGES: Objection, lacks foundation, 11:33:05AM

7 argumentative, vague and ambiguous. 11:33:06AM

8 THE WITNESS: I don't recall. 11:33:08AM

9 BY MR. FEE: 11:33:08AM

10 Q Do you recall any explanation as to why 11:33:08AM

11 Mr. Weimer could not access any of the plaintiffs' 11:33:10AM

12 standards? 11:33:13AM

13 MR. BRIDGES: Objection, lacks foundation, 11:33:15AM

14 vague and ambiguous. 11:33:16AM

15 THE WITNESS: I don't recall. 11:33:18AM

16 BY MR. FEE: 11:33:18AM

17 Q Do you recall any testimony about why 11:33:19AM

18 Mr. Weimer couldn't access any standard that had 11:33:20AM

19 been incorporated by reference by any governmental 11:33:23AM

20 agency? 11:33:26AM

21 MR. BRIDGES: Objection, lacks foundation, 11:33:28AM

22 vague and ambiguous. 11:33:28AM

23 THE WITNESS: I remember the general topic 11:33:37AM

24 of his testimony, but not the specifics. 11:33:39AM

25 BY MR. FEE: 11:33:41AM

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1 Q So you can't recall any circumstance that 11:33:42AM  
2 prevented him from accessing any particular 11:33:46AM  
3 standard? 11:33:49AM

4 MR. BRIDGES: Objection, lacks foundation, 11:33:50AM  
5 vague and ambiguous. 11:33:50AM

6 THE WITNESS: I -- I don't recall. 11:33:52AM  
7 BY MR. FEE: 11:33:52AM

8 Q Can you identify any circumstances in 11:33:53AM  
9 which any home builder, for example, was unable to 11:33:55AM  
10 access standards that were incorporated by reference 11:33:58AM  
11 that might be relevant to someone building a home? 11:34:00AM

12 MR. BRIDGES: Objection, competence, may 11:34:04AM  
13 call for speculation, vague and ambiguous, lacks 11:34:07AM  
14 foundation. 11:34:09AM

15 THE WITNESS: Mr. Peterson related such a 11:34:11AM  
16 story. 11:34:13AM

17 BY MR. FEE: 11:34:15AM

18 Q Any others? 11:34:17AM

19 MR. BRIDGES: Same objections. 11:34:19AM

20 THE WITNESS: I don't recall. 11:34:22AM

21 BY MR. FEE: 11:34:22AM

22 Q So Mr. Peterson identified one instance in 11:34:23AM  
23 which a home builder was unable to access a standard 11:34:26AM  
24 as incorporated by reference? 11:34:29AM

25 MR. BRIDGES: Same objections. 11:34:32AM

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1 THE WITNESS: It's in a video on our 11:34:34AM  
2 website. 11:34:37AM  
3 BY MR. FEE: 11:34:37AM  
4 Q And it's one home builder? 11:34:39AM  
5 MR. BRIDGES: Same objection. 11:34:44AM  
6 THE WITNESS: I -- I don't recall. 11:34:45AM  
7 BY MR. FEE: 11:34:45AM  
8 Q Do you recall there being more than one 11:34:45AM  
9 home builder that he referenced? 11:34:47AM  
10 A I'd have to review the transcript to see 11:34:49AM  
11 if he was speaking about one or many. 11:34:52AM  
12 MR. BRIDGES: The answer (sic) is do you 11:34:54AM  
13 recall. 11:34:56AM  
14 THE WITNESS: No, I don't. 11:34:59AM  
15 MR. BRIDGES: Please -- 11:34:59AM  
16 BY MR. FEE: 11:34:59AM  
17 Q Are you aware of any circumstances -- 11:34:59AM  
18 MR. BRIDGES: I've just -- I've got to 11:34:59AM  
19 instruct the witness. Please listen carefully to 11:34:59AM  
20 his questions and answer his question. 11:35:00AM  
21 THE WITNESS: Okay. 11:35:04AM  
22  
23 BY MR. FEE: 11:35:04AM  
24 Q Are you aware of any of the circumstances 11:35:23AM  
25 that led to this home builder's inability to access 11:35:25AM

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1 standards that he was governed by via incorporation 11:35:29AM  
2 by reference? 11:35:35AM

3 MR. BRIDGES: Objection, lacks foundation, 11:35:38AM  
4 assumes facts not in evidence, vague and ambiguous, 11:35:38AM  
5 argumentative. 11:35:39AM

6 THE WITNESS: No. 11:35:41AM

7 MR. BRIDGES: I'm sorry? 11:35:41AM

8 THE WITNESS: No. 11:35:41AM

9 BY MR. FEE: 11:35:41AM

10 Q Are you aware of any evidence that that 11:35:48AM  
11 home was actually not built due to this inability to 11:35:49AM  
12 access standards incorporated by reference? 11:35:53AM

13 MR. BRIDGES: Objection, completely lacks 11:35:57AM  
14 foundation, vague and ambiguous, argumentative. 11:35:58AM

15 THE WITNESS: No. 11:36:01AM

16 BY MR. FEE: 11:36:01AM

17 Q Have you been looking for somebody who you 11:36:36AM  
18 could identify as an example of a person who 11:36:39AM  
19 suffered as a result of inability to access a 11:36:44AM  
20 standard incorporated by reference? 11:36:47AM

21 MR. BRIDGES: Objection, argumentative, 11:36:49AM  
22 lacks foundation, argumentative -- or that's -- I 11:36:50AM  
23 guess I said that -- vague and ambiguous. 11:36:54AM

24 THE WITNESS: No. 11:36:58AM

25 BY MR. FEE: 11:36:58AM

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1 registration for any of the plaintiffs' standards? 11:43:24AM

2 MR. BRIDGES: Lacks foundation, vague and 11:43:28AM

3 ambiguous. 11:43:29AM

4 THE WITNESS: Yes. 11:43:30AM

5 BY MR. FEE: 11:43:30AM

6 Q Have you seen copyright registrations for 11:43:31AM

7 all three of the plaintiffs' works? 11:43:34AM

8 MR. BRIDGES: Same objections. 11:43:36AM

9 THE WITNESS: I don't know. 11:43:39AM

10 BY MR. FEE: 11:43:39AM

11 Q Which plaintiffs do you recall seeing 11:43:40AM

12 copyright registrations for? 11:43:42AM

13 MR. BRIDGES: Same objections. 11:43:44AM

14 THE WITNESS: I actually don't recall. 11:43:48AM

15 BY MR. FEE: 11:43:59AM

16 Q Are you aware of any evidence that any 11:44:03AM

17 participants in the ASTM standard development 11:44:06AM

18 process claimed to be the owner of the copyrights 11:44:10AM

19 for any of the standards that ASTM claims to be 11:44:13AM

20 infringed in this case? 11:44:17AM

21 MR. BRIDGES: Well, objection. Calls for 11:44:19AM

22 a legal conclusion, may call for attorney-client 11:44:20AM

23 communications, in which case I would instruct him 11:44:29AM

24 not to answer. 11:44:33AM

25 THE WITNESS: I don't know. I'm sorry. 11:44:35AM

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1 MR. BRIDGES: Please let me -- 11:44:36AM

2 THE WITNESS: I'm sorry. 11:44:38AM

3 MR. BRIDGES: -- finish my objections. 11:44:38AM

4 Assumes facts not in evidence and lacks foundation. 11:44:44AM

5 BY MR. FEE: 11:44:45AM

6 Q Are you aware of any evidence that any 11:44:45AM

7 participants in the NFPA standard development 11:44:47AM

8 process claim to be the owner of the copyright for 11:44:51AM

9 any NFPA standards? 11:44:55AM

10 MR. BRIDGES: All the same objections, and 11:44:58AM

11 I can't remember if I included argumentative. 11:44:59AM

12 THE WITNESS: I don't know. 11:45:02AM

13 BY MR. FEE: 11:45:02AM

14 Q You don't know if you're aware or you're 11:45:03AM

15 not aware of any? 11:45:04AM

16 A I -- I'm not aware of any. 11:45:06AM

17 Q Are you aware of any evidence that members 11:45:07AM

18 or participants in the ASHRAE standard development 11:45:11AM

19 process claimed to be owners of the copyrights that 11:45:15AM

20 are at issue and were registered by ASHRAE? 11:45:19AM

21 MR. BRIDGES: I'm -- I'm sorry. Can you 11:45:26AM

22 repeat that, please? 11:45:26AM

23 (The reporter read the record 11:45:41AM

24 as requested.) 9:21:04AM

25 MR. BRIDGES: Okay. Calls for a legal 11:45:41AM

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1 conclusion, assumes facts not in evidence, 11:45:43AM  
2 argumentative, lacks foundation, vague and 11:45:45AM  
3 ambiguous. 11:45:47AM

4 THE WITNESS: I'm not aware of any. 11:45:48AM

5 MR. BRIDGES: And -- and one other, 11:45:51AM  
6 please, attorney-client privilege. I'm asking him 11:45:51AM  
7 not to testify as to -- attorney-client privileged 11:45:55AM  
8 and work product. Asking you not to testify as to 11:45:59AM  
9 anything you may know from counsel or subject to 11:46:04AM  
10 communication with counsel. 11:46:06AM

11 BY MR. FEE: 11:46:08AM

12 Q Are you aware of any evidence that any 11:46:08AM  
13 participants in the ASTM standard development 11:46:11AM  
14 process claimed to be the owners of the copyrights 11:46:14AM  
15 in the standards that they were involved in? 11:46:17AM

16 MR. BRIDGES: All the same objections. 11:46:22AM

17 THE WITNESS: Same answer; I'm not aware. 11:46:24AM

18 BY MR. BRIDGES: 11:46:25AM

19 Q You're not aware of any evidence along 11:46:26AM  
20 those lines? 11:46:28AM

21 MR. BRIDGES: All the same objections. 11:46:32AM

22

23 BY MR. FEE: 11:46:33AM

24 Q Correct? 11:46:34AM

25 A I -- I don't want to discuss 11:46:35AM

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1 Q Do you deny saying that? 11:49:47AM

2 A I don't think I would ever use the phrase, 11:49:50AM

3 "strong copyright interests," sir. 11:49:50AM

4 Q No? 11:49:53AM

5 A That doesn't sound like me. 11:49:53AM

6 Q Okay. Who is Debra Hunt? 11:50:05AM

7 A I -- I don't recall. 11:50:18AM

8 Q I'm going to hand you what's been marked 11:50:32AM

9 as Exhibit 33. It's a series of e-mails between you 11:50:34AM

10 and Debra Hunt, Bates-labeled PRO 166616 through 18. 11:50:38AM

11 (Exhibit 33 marked for identification.) 11:50:51AM

12 THE WITNESS: Yeah, this appears to be an 11:51:29AM

13 exchange between me and -- and Ms. Hunt. 11:51:31AM

14 BY MR. FEE: 11:51:32AM

15 Q Have you had a chance to read this e-mail 11:51:35AM

16 enough to see that you referred to the standards 11:51:37AM

17 having a strong copyright interest? 11:51:40AM

18 A I do indeed. 11:51:42AM

19 Q Okay. Does that refresh your recollection 11:51:43AM

20 about whether or not you've referred to the 11:51:44AM

21 standards as having strong copyright interests in 11:51:47AM

22 the past? 11:51:51AM

23 MR. BRIDGES: Objection, may call for a 11:51:52AM

24 legal conclusion and vague and ambiguous. 11:51:54AM

25 THE WITNESS: And I think you've pulled 11:51:58AM

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1 standards? 12:00:36PM

2 A I don't recall. 12:00:44PM

3 Q I want to draw your attention to the first 12:00:47PM

4 page you see at the top it says -- on March 12, 2012 12:00:50PM

5 at 12:41 p.m., Seamus Kraft wrote -- and it says, 12:00:58PM

6 "can you give me a few more details on what is going 12:01:01PM

7 to happen?" 12:01:05PM

8 Do you see that? 12:01:06PM

9 A Uh-huh. Yes. 12:01:06PM

10 Q And then below there is one, two, three, 12:01:07PM

11 four, five -- six paragraphs and a numbered list of 12:01:09PM

12 three items. Do you see that? 12:01:15PM

13 A Yes, I do. 12:01:18PM

14 Q And then your name is below that, correct? 12:01:19PM

15 A Yes. 12:01:24PM

16 Q And isn't it correct that you wrote those 12:01:25PM

17 paragraphs that list the three items and your name 12:01:28PM

18 there? 12:01:32PM

19 A Yes. 12:01:34PM

20 Q I want to turn your attention to the 12:01:36PM

21 second paragraph on this, the one that starts with 12:01:38PM

22 sure. Do you see that? 12:01:40PM

23 A Uh-huh. Yes. 12:01:42PM

24 Q So the third sentence says all of these 12:01:42PM

25 standards are heavily copyright protected. 12:01:47PM

100

1 Do you see that? 12:01:50PM

2 MR. BRIDGES: Objection, misstates the 12:01:51PM

3 document and -- yeah, misstates -- misdescribes the 12:01:52PM

4 document. 12:01:58PM

5 THE WITNESS: I see that sentence in that 12:02:00PM

6 paragraph, yes. 12:02:02PM

7 BY MR. FEE: 12:02:02PM

8 Q Okay. And you wrote that, correct? 12:02:03PM

9 A Yes, I did. 12:02:05PM

10 Q And you were referencing the 73 standards, 12:02:06PM

11 correct? 12:02:15PM

12 A Yes, sir. 12:02:16PM

13 Q What did you mean when you said that all 12:02:16PM

14 of the 73 standards are heavily copyright protected? 12:02:18PM

15 MR. BRIDGES: Objection to the extent it 12:02:23PM

16 calls for a legal conclusion, vague and ambiguous. 12:02:24PM

17 THE WITNESS: I meant that the standards 12:02:27PM

18 bodies were very aggressive in claiming copyright 12:02:29PM

19 on those documents. 12:02:33PM

20 BY MR. FEE: 12:02:34PM

21 Q So you understood that they were copyright 12:02:34PM

22 protected? 12:02:37PM

23 MR. BRIDGES: Objection. That calls for a 12:02:38PM

24 legal conclusion. 12:02:40PM

25 THE WITNESS: That's not what I said. I 12:02:42PM

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1 Q So it's your understanding that the NFPA 12:09:24PM  
2 web -- NFPA website has evidence of federal 12:09:27PM  
3 government employees attempting to assign whatever 12:09:31PM  
4 copyrights they have to NFPA? 12:09:34PM

5 MR. BRIDGES: All the same objections as 12:09:37PM  
6 to the earlier line of questions and same 12:09:38PM  
7 instruction. 12:09:43PM

8 THE WITNESS: Yes. 12:09:43PM  
9 BY MR. FEE: 12:09:43PM

10 Q Did you see similar information with 12:09:45PM  
11 respect to the other plaintiffs in this case? 12:09:46PM

12 MR. BRIDGES: All the same objections, 12:09:49PM  
13 plus lacks foundation, vague and ambiguous. 12:09:50PM

14 THE WITNESS: I actually don't recall. 12:09:53PM  
15 BY MR. FEE: 12:09:54PM

16 Q Aside from federal government employees, 12:09:57PM  
17 are you aware of any other evidence that 12:09:58PM  
18 participants in the standard development for any of 12:10:02PM  
19 the plaintiffs failed to properly transfer their 12:10:05PM  
20 copyright interests to the plaintiffs in this case? 12:10:09PM

21 MR. BRIDGES: All the same objections. 12:10:11PM

22 THE WITNESS: That's totally beyond my 12:10:15PM  
23 expertise. I -- I can't answer that question. 12:10:17PM

24 BY MR. FEE: 12:10:19PM

25 Q Does Public Resource claim to be the owner 12:10:26PM

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1 of any copyrighted interest in any of the standards 12:10:29PM

2 at issue in this case? 12:10:32PM

3 MR. BRIDGES: Objection, calls for a legal 12:10:34PM

4 conclusion. 12:10:35PM

5 THE WITNESS: No. 12:10:36PM

6 BY MR. FEE: 12:10:37PM

7 Q Do you personally claim to be the owner of 12:10:37PM

8 any copyright interest for any of the standards at 12:10:39PM

9 issue in this case? 12:10:43PM

10 MR. BRIDGES: Same objections. 12:10:44PM

11 THE WITNESS: No. 12:10:46PM

12 BY MR. FEE: 12:10:46PM

13 Q Do you acknowledge that the writing of 12:11:06PM

14 plaintiffs' standards requires some sort of 12:11:09PM

15 creativity to actually put words on paper? 12:11:13PM

16 MR. BRIDGES: Objection to the extent it 12:11:17PM

17 calls for a legal conclusion, assumes many facts 12:11:19PM

18 not in evidence, lacks foundation, competence, 12:11:23PM

19 calls for speculation and vague and ambiguous. 12:11:25PM

20 THE WITNESS: I'm not qualified to answer 12:11:35PM

21 that question, sir. 12:11:36PM

22

23 BY MR. FEE: 12:11:36PM

24 Q Are you aware of any evidence that would 12:11:36PM

25 suggest that any of the standards at issue in this 12:11:38PM

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1 THE WITNESS: A specific incorporation by 1:08:27PM  
2 reference for PHMSA, of the Pipeline and Hazardous 1:08:30PM  
3 Materials Safety Administration is actually Section 1:08:32PM  
4 192.7 of that section of the CFR. 1:08:37PM  
5 BY MR. FEE: 1:08:41PM  
6 Q Okay. 1:08:41PM  
7 MR. FEE: What are we on? 1:09:02PM  
8 THE REPORTER: Now we're on 38. 1:09:05PM  
9 (Exhibit 38 marked for identification.) 1:09:06PM  
10 BY MR. FEE: 1:09:07PM  
11 Q I'm going to hand you what's been marked 1:09:07PM  
12 as Exhibit 38. It's entitled, "Public Safety 1:09:10PM  
13 Standards, United States Federal Government," 1:09:12PM  
14 PRO 166182 through 166257. 1:09:12PM  
15 MR. BRIDGES: Do you have any further 1:09:29PM  
16 questions on Exhibit 37 or -- 1:09:30PM  
17 MR. FEE: We're going to be going back to 1:09:37PM  
18 that. 1:09:41PM  
19 BY MR. FEE: 1:09:41PM  
20 Q Mr. Malamud, do you recognize what Exhibit 1:09:41PM  
21 38 is? 1:09:46PM  
22 A It appears to be our U.S. manifest for the 1:09:47PM  
23 Code of Federal Regulations. 1:09:50PM  
24 Q Can you identify a place in Exhibit 38 1:09:54PM  
25 where you identify any standard -- or identified 1:09:57PM

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1 of the specific standard. Those are the two 1:21:50PM  
2 criteria we use. 1:21:53PM  
3 THE REPORTER: 40. 1:22:12PM  
4 (Exhibit 40 marked for identification.) 11:31:26AM  
5 BY MR. FEE: 1:22:13PM  
6 Q I'm going to hand you what's been marked 1:22:14PM  
7 as Exhibit 40. It's a -- entitled, "Public Safety 1:22:15PM  
8 Codes Incorporated by Law," PRO 166258 through -267. 1:22:18PM  
9 Mr. Malamud, is Exhibit 40 essentially the 1:22:53PM  
10 state version of Exhibit 38 that you were testifying 1:22:55PM  
11 about earlier? 1:22:57PM  
12 MR. BRIDGES: Objection, vague and 1:22:58PM  
13 ambiguous. 1:22:59PM  
14 THE WITNESS: This appears to be an older 1:23:03PM  
15 version of our -- there's no date on this. When 1:23:04PM  
16 was this screen dump taken? 1:23:13PM  
17 BY MR. FEE: 1:23:16PM  
18 Q Your -- you produced this document. Do 1:23:16PM  
19 you see the Bates label? 1:23:17PM  
20 A Okay. Yeah, this -- this says, "Public 1:23:20PM  
21 Safety Codes Incorporated by Law" and by States 1:23:22PM  
22 and -- and one city. 1:23:27PM  
23 Q Do you believe Exhibit 40 to be an old 1:23:29PM  
24 version of this document? 1:23:31PM  
25 MR. BRIDGES: Objection, vague and 1:23:33PM

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1 of the standards that were posted on Public 1:27:37PM  
2 Resource's website as a result of an incorporation 1:27:39PM  
3 by reference by a nonfederal government entity? 1:27:42PM

4 A I think so. 1:27:49PM

5 MR. FEE: We've been going about an hour 1:28:58PM  
6 again. Do you want to take a lunch break now? 1:29:00PM

7 MR. BRIDGES: If you want. 1:29:02PM

8 MR. FEE: Why don't we do that. 1:29:04PM

9 THE VIDEOGRAPHER: We're going off the 1:29:05PM  
10 record. The time is 1:29 p.m. 1:29:06PM

11 (Lunch recess taken.) 10:27:40AM

12 THE VIDEOGRAPHER: We're back on the 2:25:54PM  
13 record. The time is 2:26 p.m. 2:25:55PM

14 BY MR. FEE: 2:25:58PM

15 Q Mr. Malamud, before lunch we spoke a 2:25:59PM  
16 little bit about the process that you went through 2:26:02PM  
17 in purchasing and making copies of the 73 standards. 2:26:05PM  
18 I -- I want to talk to you now about the process you 2:26:09PM  
19 used to make electronic copies of some of the 2:26:12PM  
20 standards going forward. 2:26:16PM

21 Can you describe briefly what process you 2:26:19PM  
22 go through to post the standards at issue on your 2:26:21PM  
23 website? 2:26:26PM

24 A Step one is to determine whether a 2:26:31PM  
25 standard has been explicitly incorporated by 2:26:33PM

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1 reference. Step two is to get a copy of the 2:26:38PM  
2 standard and scan it. Step three is to append a 2:26:43PM  
3 cover sheet. And then Step four is to transfer it 2:26:55PM  
4 onto the htdocs segment of our web server, which is 2:27:01PM  
5 where documents live. 2:27:05PM

6 Q And once the document is on your htdocs 2:27:11PM  
7 web server, is it generally accessible to the 2:27:14PM  
8 public? 2:27:25PM

9 A Yes. 2:27:25PM

10 Q Now, for the standards that are posted on 2:27:25PM  
11 your website, did you always purchase paper copies 2:27:29PM  
12 of those standards and then scan them, or did you 2:27:32PM  
13 buy electronic copies at times? 2:27:36PM

14 A For the standards at issue they're all 2:27:39PM  
15 paper copies. 2:27:43PM

16 Q Did you purchase any of the paper copies 2:27:45PM  
17 of the standards at issue directly from one of the 2:27:47PM  
18 plaintiffs? 2:27:50PM

19 MR. BRIDGES: Objection, asked and 2:27:51PM  
20 answered. 2:27:51PM

21 THE WITNESS: We -- we already went over 2:27:52PM  
22 that, I believe, on NFPA and ASTM for -- 2:27:53PM

23 BY MR. FEE: 2:27:57PM

24 Q And that was with respect to standards 2:27:58PM  
25 that are on the Public Resource website? You did 2:28:01PM

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1 purchase directly from NFPA and ASTM? 2:28:05PM

2 MR. BRIDGES: Same objection. 2:28:13PM

3 THE WITNESS: Yes. 2:28:13PM

4 BY MR. FEE: 2:28:14PM

5 Q And, to the best of your recollection, you 2:28:14PM

6 never purchased electronic copies of any of the 2:28:16PM

7 standards at issue; is that right? 2:28:19PM

8 A That is correct. 2:28:23PM

9 Q Now, how did you determine whether or -- 2:28:23PM

10 strike that. 2:28:34PM

11 Once you obtained a paper copy of the 2:28:41PM

12 standard, who scanned that paper copy? 2:28:44PM

13 A I did. 2:28:48PM

14 Q And that's true for all the standards at 2:28:49PM

15 issue in this case? 2:28:55PM

16 A Yes. 2:28:56PM

17 Q In what file format was the output from 2:28:56PM

18 your scan? 2:29:00PM

19 MR. BRIDGES: Objection, vague, ambiguous. 2:29:03PM

20 THE WITNESS: PDF. 2:29:06PM

21 BY MR. FEE: 2:29:07PM

22 Q Did you post a PDF copy of every of the 2:29:14PM

23 standards at issue in this case on the Public 2:29:18PM

24 Resource website? 2:29:21PM

25 MR. BRIDGES: Objection, vague and 2:29:23PM



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1 workflow is the double-key operation, um, and 2:30:35PM

2 that's the conversion into an HTML file with JPG 2:30:36PM

3 images, J -- J-P-G. 2:30:39PM

4 BY MR. FEE: 2:30:42PM

5 Q Who did the conversion of the HTM -- HTML 2:31:00PM

6 file into JPG? 2:31:03PM

7 A HTC did. 2:31:07PM

8 THE REPORTER: HTC? 2:31:09PM

9 THE WITNESS: HTC. 2:31:09PM

10 BY MR. FEE: 2:31:09PM

11 Q What would happen after the file was 2:31:16PM

12 converted into a JPG format and before it was posted 2:31:19PM

13 on the Public Resource website? 2:31:22PM

14 A I'm not sure I understand that question. 2:31:29PM

15 Q Okay. Right. Isn't it the case that at 2:31:34PM

16 least with some of the standards at issue you posted 2:31:37PM

17 file formats that included SVG and/or MathML 2:31:40PM

18 elements? 2:31:43PM

19 A That would be the third step of the 2:31:46PM

20 workflow after the HTML JPG step. 2:31:48PM

21 Q Okay. That's what I was trying to get at. 2:31:53PM

22 Who did that work? 2:31:54PM

23 A Point.B Studio. 2:31:55PM

24 Q And Point.B Studio is run by your wife, 2:32:03PM

25 Rebecca Malamud, correct? 2:32:07PM

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1 understanding, yes. 2:33:30PM

2 BY MR. FEE: 2:33:31PM

3 Q Do you have any more detailed knowledge 2:33:32PM

4 regarding the process used that were used by your 2:33:34PM

5 contractors other than what you've already described 2:33:37PM

6 to me? 2:33:39PM

7 MR. BRIDGES: Objection, argumentative, 2:33:40PM

8 vague and ambiguous. 2:33:40PM

9 THE WITNESS: Yeah, I have a vague and 2:33:42PM

10 overall understanding of the process they went 2:33:44PM

11 through. 2:33:46PM

12 BY MR. FEE: 2:33:47PM

13 Q Okay. Well, let's start with HTC, then. 2:33:47PM

14 First of all, I want to make sure I understand. You 2:33:49PM

15 delivered to HTC PDFs of the standards at issue in 2:33:53PM

16 this case, correct? 2:33:58PM

17 A That's correct. 2:33:59PM

18 Q After HTC received the PDF files, what is 2:34:00PM

19 your understanding as to the next step that was done 2:34:06PM

20 by HTC Global? 2:34:08PM

21 A The next -- 2:34:10PM

22 MR. BRIDGES: Objection, vague and 2:34:12PM

23 ambiguous. 2:34:13PM

24 Sorry. 2:34:14PM

25 THE WITNESS: Next step is to take each of 2:34:15PM

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1 the images inside of the document and save them as 2:34:17PM

2 a separate JPG file with a very specific 2:34:21PM

3 file-naming convention which I gave them. 2:34:25PM

4 BY MR. FEE: 2:34:27PM

5 Q What happens next at HTC, to the best of 2:34:29PM

6 your knowledge? 2:34:32PM

7 A They then go through the double-key 2:34:33PM

8 process with the text. 2:34:35PM

9 Q What is the double-key process? 2:34:40PM

10 A In the double-key process, two individuals 2:34:41PM

11 or two teams of individuals independently type in 2:34:45PM

12 the document and then the two versions are compared 2:34:50PM

13 to find any errors. 2:34:55PM

14 Q Is it your understanding as of today that 2:35:13PM

15 HTC Global engaged in a double-key process for the 2:35:15PM

16 standards at issue? 2:35:19PM

17 A Yes. 2:35:23PM

18 Q You don't believe that HTC was using OCR 2:35:40PM

19 software to deliver the HTML that was provided to 2:35:46PM

20 you? 2:35:52PM

21 MR. BRIDGES: Objection, lacks foundation, 2:35:52PM

22 vague and ambiguous, argumentative. 2:35:53PM

23 THE WITNESS: I -- I don't believe they 2:35:56PM

24 were. 2:35:57PM

25 BY MR. FEE: 2:35:59PM

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1 BY MR. FEE: 2:37:26PM

2 Q Did you consider using a triple-key 2:37:27PM

3 process with HTC Global? 2:37:29PM

4 MR. BRIDGES: Objection, vague and 2:37:32PM

5 ambiguous. 2:37:33PM

6 THE WITNESS: I asked HTC for a quote for 2:37:34PM

7 triple-key. 2:37:37PM

8 BY MR. FEE: 2:37:38PM

9 Q Did HTC provide a quote for triple-key? 2:37:39PM

10 A They did. 2:37:44PM

11 Q I'm going to hand you -- I'm going to hand 2:37:47PM

12 you what's previously been marked as Exhibit 2. 2:37:54PM

13 It's an e-mail to you from Hemant Talwalkar, 2:37:58PM

14 Bates-label PRO 4964. 2:38:01PM

15 MR. BRIDGES: I'm sorry. Can you read 2:38:29PM

16 back his statement? 2:38:29PM

17 (The reporter read the record 2:38:30PM

18 as requested.) 2:38:30PM

19 MR. BRIDGES: I'm sorry.

20 THE REPORTER: Sure.

21 BY MR. FEE: 2:38:31PM

22 Q First of all, do you recognize Exhibit 2 2:38:31PM

23 as an e-mail between you and Hemant Talwalkar? 2:38:32PM

24 A It appears to be a message from Hemant to 2:38:40PM

25 me. 2:38:42PM

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1 Q Is this the price quote that you were 2:38:43PM  
2 referencing? 2:38:45PM

3 A It is, yes. 2:38:49PM

4 Q In the chart that has the price quote, do 2:38:50PM  
5 you see that there's a column there that says, 2:38:53PM  
6 "accuracy"? 2:38:56PM

7 A Yes. 2:38:59PM

8 Q And for double-key compare, it has an 2:39:00PM  
9 accuracy of 99.51 percent. Do you see that? 2:39:05PM

10 A I do. 2:39:11PM

11 MR. BRIDGES: Objection. 2:39:11PM

12 THE WITNESS: I'm sorry. 2:39:13PM

13 BY MR. FEE: 2:39:16PM

14 Q Do you have an understanding as to what 2:39:17PM  
15 that means? 2:39:18PM

16 MR. BRIDGES: Objection, lack of 2:39:21PM  
17 competence, may call for speculation, vague and 2:39:24PM  
18 ambiguous. 2:39:26PM

19 THE WITNESS: That is the error tolerance 2:39:28PM  
20 for the double-key versus the triple-key process. 2:39:30PM

21 BY MR. FEE: 2:39:38PM

22 Q Is it your understanding that the e-mail 2:39:38PM  
23 from -- Mr. Talwalkar, first of all, he's from HTC 2:39:43PM  
24 Global, right? 2:39:45PM

25 A Yes. 2:39:47PM

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1 Q Okay. So does his e-mail to you 2:39:47PM

2 indicating the double-key compare has an accuracy of 2:39:51PM

3 99.51 percent mean that there are up to 0.49 percent 2:39:54PM

4 inaccurate results from double-keying? 2:40:02PM

5 MR. BRIDGES: Objection, lacks foundation, 2:40:05PM

6 assumes facts not in evidence, argumentative, vague 2:40:06PM

7 and ambiguous. 2:40:09PM

8 THE WITNESS: It's -- it's the error 2:40:11PM

9 tolerance, are -- there are no more than that many 2:40:13PM

10 errors. 2:40:16PM

11 BY MR. FEE: 2:40:17PM

12 Q You understood that double-key compare 2:40:17PM

13 would lead to some inaccuracies, right? 2:40:20PM

14 MR. BRIDGES: Objection, lacks foundation. 2:40:24PM

15 THE WITNESS: Not necessarily. It depends 2:40:25PM

16 on the subject matter of -- of the source material. 2:40:27PM

17 BY MR. FEE: 2:40:29PM

18 Q Did you have any reason to believe that 2:40:30PM

19 the standards at issue if double-keyed would lead to 2:40:31PM

20 100 percent accuracy? 2:40:34PM

21 MR. BRIDGES: Objection, argumentative, 2:40:37PM

22 lacks foundation, vague and ambiguous. 2:40:38PM

23 THE WITNESS: I -- I believe that -- that 2:40:45PM

24 there would be a -- a maximum error tolerance of -- 2:40:45PM

25 of 99.51 minus 100. 2:40:57PM

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1 BY MR. FEE: 2:41:01PM

2 Q Was it your understanding that this error 2:41:02PM

3 tolerance -- or strike that -- accuracy, I should 2:41:02PM

4 say, rate was based upon a sampling of the materials 2:41:04PM

5 that you were asking HTC Global to double-key? 2:41:08PM

6 MR. BRIDGES: Objection, lacks foundation, 2:41:13PM

7 assumes facts not in evidence, argumentative, vague 2:41:14PM

8 and ambiguous. 2:41:20PM

9 THE WITNESS: 99.51 percent is, I believe, 2:41:23PM

10 the industry standard for a double-key compare. 2:41:25PM

11 BY MR. FEE: 2:41:29PM

12 Q And HTC Global also provided you with a -- 2:41:33PM

13 a price quote for triple-key compare, correct? 2:41:36PM

14 A That's correct. 2:41:41PM

15 Q And the accuracy rate for triple-key 2:41:42PM

16 compare is greater than the double-key compare, 2:41:49PM

17 right? 2:41:52PM

18 MR. BRIDGES: Objection, hypotheticals, 2:41:53PM

19 lacks foundation, assumes facts not in evidence, 2:41:54PM

20 argumentative, vague and ambiguous. 2:41:55PM

21 THE WITNESS: The maximum error tolerance 2:41:57PM

22 is less for triple-key than it is for double-key. 2:42:00PM

23 BY MR. FEE: 2:42:04PM

24 Q And triple-keying is more expensive than 2:42:05PM

25 double-keying, correct? 2:42:07PM

169

1 MR. BRIDGES: Objection, lacks foundation, 2:42:09PM  
2 vague and ambiguous. 2:42:09PM

3 THE WITNESS: On this quote it is. 2:42:11PM

4 BY MR. FEE: 2:42:15PM

5 Q And is it correct that after receiving 2:42:16PM  
6 this quote, Public Resource elected to use 2:42:19PM  
7 double-key compare instead of triple-key compare? 2:42:24PM

8 A Yes. 2:42:30PM

9 Q Why did it make that decision? 2:42:31PM

10 A Again, based on my research on standard 2:42:36PM  
11 industry practices, double-key is what's used in the 2:42:39PM  
12 legal industry. 2:42:42PM

13 Q You understood that double-keying would be 2:42:49PM  
14 less accurate than triple-keying in this 2:42:51PM  
15 circumstance, right? 2:42:56PM

16 MR. BRIDGES: Objection, misstates 2:42:57PM  
17 testimony, lacks foundation, argumentative and 2:42:58PM  
18 assumes facts not in evidence. 2:43:02PM

19 THE WITNESS: Again, I think you 2:43:05PM  
20 misstated. It's the maximum error tolerance is 2:43:06PM  
21 less on triple-key than on double-key. 2:43:11PM

22

23 BY MR. FEE: 2:43:13PM

24 Q Is it true that Public Resource was 2:43:15PM  
25 willing to live with a higher error tolerance in 2:43:15PM

170

1 order to save money on HTC Global's services? 2:43:21PM

2 MR. BRIDGES: Objection, lacks foundation, 2:43:24PM

3 argumentative, vague and ambiguous. 2:43:25PM

4 THE WITNESS: Double-key seemed to be 2:43:31PM

5 perfectly appropriate for the task at hand. 2:43:33PM

6 BY MR. FEE: 2:43:37PM

7 Q So public Resource was willing to accept 2:43:37PM

8 the higher error tolerance associated with 2:43:40PM

9 double-keying -- 2:43:43PM

10 MR. BRIDGES: Objection -- 2:43:44PM

11 BY MR. FEE: 2:43:44PM

12 Q -- right? 2:43:44PM

13 MR. BRIDGES: Objection, misstates 2:43:44PM

14 testimony, lacks foundation, vague and ambiguous 2:43:45PM

15 and argumentative. 2:43:47PM

16 THE WITNESS: It's potentially higher 2:43:48PM

17 error tolerance under the double-key method. 2:43:48PM

18 BY MR. FEE: 2:43:52PM

19 Q Well, your supplier told you that it was 2:43:53PM

20 going to be a higher error tolerance, right? 2:43:54PM

21 MR. BRIDGES: Objection, lacks foundation, 2:43:57PM

22 vague and ambiguous. 2:43:58PM

23 THE WITNESS: Again, it depends on the 2:44:00PM

24 nature of the source material. But, yes, the -- 2:44:01PM

25 the -- the error tolerance of double-key is, in 2:44:02PM

171

1 fact, 99.51 percent, which is what HTC quoted. 2:44:06PM

2 BY MR. FEE: 2:44:13PM

3 Q At any point in time did you suggest to 2:44:30PM

4 any person working with Public Resource that HTC may 2:44:35PM

5 not be double-keying the standards that you had 2:44:39PM

6 provided to it? 2:44:42PM

7 MR. BRIDGES: Objection, lacks foundation, 2:44:45PM

8 vague and ambiguous. 2:44:47PM

9 THE WITNESS: I don't recall. 2:44:50PM

10 BY MR. FEE: 2:44:52PM

11 Q Have you ever suggested to Rebecca Malamud 2:45:35PM

12 that HTC Global may have been cheating and doing OCR 2:45:38PM

13 in connection with some of the work it was doing for 2:45:43PM

14 Public Resource? 2:45:46PM

15 MR. BRIDGES: Objection, vague and 2:45:47PM

16 ambiguous. 2:45:47PM

17 THE WITNESS: No, I don't recall. If you 2:45:48PM

18 have a specific message, I'd be very happy to look 2:45:48PM

19 at it. 2:45:52PM

20 BY MR. FEE: 2:45:52PM

21 Q I'm going to hand you what's been marked 2:45:53PM

22 as Exhibit 21. It's a e-mail chain between 2:45:54PM

23 Mr. Malamud and Mrs. Malamud, Bates-labeled 2:45:58PM

24 PRO 42289 through -91. 2:46:02PM

25 THE REPORTER: Kevin, you said that was 2:46:21PM

172

1 previously marked, right -- 2:46:23PM

2 MR. FEE: Yes. 2:46:25PM

3 THE REPORTER: -- as 21? Thanks. 2:46:26PM

4 THE WITNESS: This seems like e-mail 2:46:48PM

5 between me and Rebecca. 2:46:50PM

6 BY MR. FEE: 2:46:55PM

7 Q I want to draw your attention to the 2:46:56PM

8 fourth paragraph of this e-mail chain, fourth from 2:46:57PM

9 the top of the first page. First of all, that 2:47:00PM

10 portion of the e-mail is a e-mail written by you to 2:47:04PM

11 Ms. Malamud, correct? 2:47:06PM

12 A That's correct. 2:47:10PM

13 Q And do you see the fourth paragraph it 2:47:10PM

14 says, "All the docs you see are in theory 2:47:13PM

15 double-keyed. Of course, they may cheat and do OCR 2:47:15PM

16 first and then do their QA." 2:47:21PM

17 Do you recall having that communication 2:47:23PM

18 with Ms. Malamud? 2:47:26PM

19 A Yes. I just told you that this appears to 2:47:28PM

20 be e-mail between me and Rebecca. 2:47:31PM

21 Q Did you have reason to believe that HTC 2:47:34PM

22 Global may have been -- may have been cheating and 2:47:36PM

23 not double-keying the work they were doing for you? 2:47:40PM

24 A No. 2:47:42PM

25 Q Why did you say that, then? 2:47:44PM

183

1 Q My math is wrong. You can go ahead and 3:02:20PM

2 say it. 3:02:22PM

3 It's about 175,000 kilo-characters? 3:02:23PM

4 A \$350,000 -- 3:02:27PM

5 MR. BRIDGES: The math will speak for 3:02:28PM

6 itself. 3:02:29PM

7 THE WITNESS: Yeah, it's 700,000 3:02:31PM

8 kilo-characters, right? 3:02:34PM

9 BY MR. FEE: 3:02:35PM

10 Q Oh, you're right. It's double. I'm not 3:02:36PM

11 doing math today. 3:02:36PM

12 Do you know how many page -- 3:02:39PM

13 kilo-characters there are on an average page in a 3:02:41PM

14 standard? 3:02:43PM

15 MR. BRIDGES: Objection, lacks foundation, 3:02:47PM

16 vague and ambiguous. 3:02:47PM

17 THE WITNESS: I knew that at one point. 3:02:49PM

18 It's not on -- off the top of my head. 3:02:50PM

19 BY MR. FEE: 3:02:52PM

20 Q So, Mr. Malamud, we were talking about the 3:05:23PM

21 process by which you took paper versions and they 3:05:24PM

22 wound up being posted on your website. And we've 3:05:28PM

23 now talked a lot about the double-keying that was 3:05:33PM

24 done by HTC Global. After you received the results 3:05:36PM

25 or the end work from HTC Global, what happened next 3:05:40PM

184

1 in the process at Public Resource? 3:05:44PM

2 A Performed quality assurance, validated the 3:05:49PM

3 HTML, made sure that all the JPG images were there, 3:05:55PM

4 so did a link validity check, and then pushed them 3:06:00PM

5 to our web server. 3:06:09PM

6 Q And that would complete the process with 3:06:13PM

7 respect to standards that are posted in HTML format, 3:06:15PM

8 right? 3:06:18PM

9 A That's a good high-level overview of the 3:06:19PM

10 work flow, yes. 3:06:22PM

11 Q Now, you had also mentioned that there 3:06:23PM

12 were some standards for which Point.B Studios did 3:06:25PM

13 some additional work; is that right? 3:06:31PM

14 A That's correct. 3:06:32PM

15 Q Okay. First of all, how would you go 3:06:32PM

16 about identifying which standards you would had ask 3:06:35PM

17 Point.B Studios to do work on? 3:06:38PM

18 A Based on my personal judgment of what 3:06:42PM

19 were -- were compelling standards that deserved that 3:06:44PM

20 next level of the workflow, given our limited 3:06:47PM

21 budget. 3:06:50PM

22 Q Once you identified an appropriate 3:06:51PM

23 standard for Point.B Studios to work upon, what 3:06:53PM

24 happened next? 3:06:57PM

25 A The job was very specific: take the HTML 3:06:59PM

185

1 file and the JPG images, convert the JPG images 3:07:02PM  
2 exactly into SVG -- SVG, silicon vector graphics or 3:07:06PM  
3 whatever that is -- and MathML, which is a language 3:07:09PM  
4 for typesetting mathematical formulas. 3:07:20PM

5 Q Prior to the first time you retained 3:07:33PM  
6 Point.B Studios to do this work on converting JPG 3:07:39PM  
7 images, what experience or expertise were you aware 3:07:41PM  
8 of that Point.B Studios had with respect to that 3:07:46PM  
9 type of activity? 3:07:49PM

10 A Rebecca Malamud is a expert on SVG graphic 3:07:56PM  
11 design, use of graphic processing tools. 3:08:00PM

12 Q Had -- to the best of your knowledge, had 3:08:05PM  
13 Point.B Studios ever done a project similar to what 3:08:12PM  
14 you had asked Point.B Studios to do for Public 3:08:15PM  
15 Resource? 3:08:18PM

16 MR. BRIDGES: Objection, competence, vague 3:08:19PM  
17 and ambiguous. 3:08:22PM

18 THE WITNESS: I know they had worked 3:08:26PM  
19 extensively with SVG and with the -- the tools used 3:08:27PM  
20 to process SVG. 3:08:31PM

21 BY MR. FEE: 3:08:33PM

22 Q Would that include taking JPG file formats 3:08:34PM  
23 and converting them into SVG file formats? 3:08:39PM

24 MR. BRIDGES: Same objections. 3:08:44PM

25 THE WITNESS: I'm not aware of anyone 3:08:44PM

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1 speculation. 3:11:03PM

2 THE WITNESS: No, I don't. 3:11:04PM

3 BY MR. FEE: 3:11:05PM

4 Q Do you know if children did that work? 3:11:05PM

5 MR. BRIDGES: Objection, argumentative, 3:11:08PM

6 lacks foundation. 3:11:08PM

7 THE WITNESS: I know Rebecca ran a 3:11:12PM

8 mentoring program teaching people graphic design 3:11:13PM

9 skills. 3:11:17PM

10 MR. BRIDGES: Please answer his question. 3:11:18PM

11 THE WITNESS: Okay. I'm sorry. Please 3:11:20PM

12 repeat the question. 3:11:21PM

13 BY MR. FEE: 3:11:22PM

14 Q My question is if you were aware of 3:11:22PM

15 whether or not children were doing the conversion 3:11:25PM

16 from JPG to MathML or SVG. 3:11:28PM

17 MR. BRIDGES: Objection, argumentative, 3:11:32PM

18 lacks foundation, vague and ambiguous. 3:11:33PM

19 THE WITNESS: Children. I'm sorry. Is -- 3:11:35PM

20 do you have a particular age limit in mind or -- 3:11:37PM

21 BY MR. FEE: 3:11:41PM

22 Q Why don't we start with under 18. 3:11:41PM

23 A Yes, I believe some students were 3:11:46PM

24 involved. 3:11:48PM

25 Q Do you know which students were involved? 3:11:52PM

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1 A No. 3:11:58PM

2 Q Was -- were these students involved 3:11:58PM

3 through something called Rural Design Collection 3:12:02PM

4 (sic)? 3:12:03PM

5 A That's correct. 3:12:06PM

6 Q And are you aware of whether or not Rural 3:12:07PM

7 Design Collective says that its target group is 3:12:11PM

8 children ages 7 to 14? 3:12:16PM

9 A If that's what it says on their website. 3:12:20PM

10 I -- I just don't recall. 3:12:23PM

11 Q Would it be your expectation that there 3:12:27PM

12 are children ages 7 to 14 doing the conversion of 3:12:29PM

13 the JPG file format images to MathML and SVG on -- 3:12:33PM

14 for Public Resource? 3:12:40PM

15 MR. BRIDGES: Objection, lacks foundation, 3:12:44PM

16 vague and ambiguous. 3:12:45PM

17 THE WITNESS: I would be speculating, but 3:12:46PM

18 that sounds awfully advanced for a 7-year-old. 3:12:48PM

19 BY MR. FEE: 3:12:52PM

20 Q Do you have any understanding as to the 3:12:53PM

21 age range of the kids who are working on a 3:12:54PM

22 conversion process for Point.B Studios' project for 3:12:58PM

23 Public Resource? 3:13:02PM

24 MR. BRIDGES: Objection, lacks foundation, 3:13:04PM

25 may call for speculation, vague and ambiguous, 3:13:04PM

190

1 argumentative. 3:13:11PM

2 THE WITNESS: My sole point of contact was 3:13:13PM

3 Rebecca, and the job was very simple: JPG in, SVG 3:13:14PM

4 and MathML back out. And that was my concern. 3:13:19PM

5 BY MR. FEE: 3:13:22PM

6 Q Did you at least understand that a group 3:13:50PM

7 of students from RDC, Rural Design Collective, were 3:13:52PM

8 doing the converting of the formulas and graphics on 3:13:57PM

9 the standards that you asked them to work on? 3:14:00PM

10 Strike that. 3:14:04PM

11 Do you at least understand that a group of 3:14:05PM

12 students from Rural Design Collective were doing the 3:14:07PM

13 conversion of formulas and graphics for the 3:14:13PM

14 standards work that you had asked Point.B Studios to 3:14:16PM

15 do for Public Resource? 3:14:23PM

16 MR. BRIDGES: Objection, lacks foundation, 3:14:25PM

17 argumentative, vague and ambiguous. 3:14:25PM

18 THE WITNESS: They did a lot more than 3:14:26PM

19 standards, the California Code of Regulations, for 3:14:27PM

20 example, the graphics images in there which are not 3:14:28PM

21 standards. 3:14:31PM

22

23 BY MR. FEE: 3:14:32PM

24 Q But you understood that children at Rural 3:14:32PM

25 Design Collective were working on the conversion of 3:14:34PM

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1 the standards that you posted on your website? 3:14:37PM

2 MR. BRIDGES: Same objections. 3:14:41PM

3 THE WITNESS: I know that students were 3:14:42PM

4 working on a conversion of JPG images into SVG and 3:14:46PM

5 MathML. I don't know which specific items anybody 3:14:51PM

6 worked on. 3:14:55PM

7 BY MR. FEE: 3:14:56PM

8 Q And you know that those kids were working 3:14:56PM

9 on that -- a conversion for work that was requested 3:14:58PM

10 by Public Resource? 3:15:00PM

11 MR. BRIDGES: Same objections. 3:15:03PM

12 THE WITNESS: Yes. 3:15:07PM

13 BY MR. FEE: 3:15:08PM

14 Q Were those kids paid? 3:15:11PM

15 MR. BRIDGES: Objection, competence, may 3:15:14PM

16 call for speculation. 3:15:16PM

17 THE WITNESS: I really don't know. 3:15:18PM

18 BY MR. FEE: 3:15:27PM

19 Q Did Public Resource provide any funds to 3:15:27PM

20 Point.B Studios for this student program? 3:15:31PM

21 MR. BRIDGES: Objection, lacks foundation, 3:15:36PM

22 argumentative, vague and ambiguous. 3:15:37PM

23 THE WITNESS: Yes. Several summers in a 3:15:41PM

24 row I added extra money to the monthly fee that we 3:15:43PM

25 paid to Point.B with the understanding that it 3:15:46PM

194

1 optimized for viewing on the web in multiple 3:18:42PM  
2 platforms, all right, so there's a -- and then the 3:18:47PM  
3 third item is an SVG source directory, which 3:18:49PM  
4 included the core work files in MathML and the fully 3:18:54PM  
5 editable SVG graphics. 3:19:00PM

6 Q What would you do with all those files? 3:19:04PM

7 MR. BRIDGES: Objection, vague and 3:19:10PM  
8 ambiguous. 3:19:11PM

9 THE WITNESS: A series of quality 3:19:11PM  
10 assurance checks, link validity, HTML validity, a 3:19:12PM  
11 comparison of at least some of the JPGs to the 3:19:18PM  
12 SVGs, a quality assurance step. 3:19:23PM

13 BY MR. FEE: 3:19:27PM

14 Q Did anything else happen after that and 3:19:28PM  
15 before the files were posted to the web? 3:19:30PM

16 MR. BRIDGES: Objection, vague and 3:19:33PM  
17 ambiguous. 3:19:34PM

18 THE WITNESS: Once I was satisfied that 3:19:36PM  
19 the work was properly done, then we posted it 3:19:37PM  
20 online. 3:19:40PM

21 BY MR. FEE: 3:19:42PM

22 Q Now, for all the files that you posted 3:19:43PM  
23 online, where did you post these files? 3:19:45PM

24 A On -- 3:19:51PM

25 MR. BRIDGES: Objection, lacks foundation 3:19:52PM

195  
1 and vague and ambiguous. 3:19:53PM  
2 THE WITNESS: On Law.Resource.Org. 3:19:56PM  
3 BY MR. FEE: 3:19:59PM  
4 Q Did you also post some version of 3:20:01PM  
5 plaintiffs' standards on Internet Archive at or 3:20:06PM  
6 around the same time as you posted them on the 3:20:10PM  
7 Public Resource website? 3:20:12PM  
8 MR. BRIDGES: Objection, argumentative, 3:20:15PM  
9 lacks foundation, vague and ambiguous. 3:20:17PM  
10 THE WITNESS: Are we still talking about 3:20:19PM  
11 SVG and HTML files? 3:20:20PM  
12 BY MR. FEE: 3:20:23PM  
13 Q No. I'm asking a more general question 3:20:23PM  
14 now. I -- maybe I should take a step back. 3:20:25PM  
15 Have you completed the story as to how the 3:20:27PM  
16 files received from Point.B Studios go from Point.B 3:20:30PM  
17 Studios to Public Resource to being posted for the 3:20:33PM  
18 public to view on the web. 3:20:38PM  
19 MR. BRIDGES: Objection, calling for a 3:20:40PM  
20 narrative, vague and ambiguous, argumentative, 3:20:40PM  
21 lacks foundation. 3:20:43PM  
22 THE WITNESS: That was a high-level 3:20:44PM  
23 overview of the workflow. 3:20:45PM  
24 BY MR. FEE: 3:20:46PM  
25 Q So at or around the time that any of the 3:20:47PM

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1 standards, either in PDF form or HTML with SVG or 3:20:52PM  
2 MathML, are posted on a Public Resource website, 3:20:56PM  
3 would Public Resource also post some version of that 3:20:59PM  
4 standard on the Internet Archive? 3:21:03PM

5 MR. BRIDGES: Objection, hypothetical, 3:21:06PM  
6 lacks foundation, vague and ambiguous. 3:21:07PM

7 THE WITNESS: Some of the PDF documents 3:21:10PM  
8 were added to my Internet Archive collection. 3:21:13PM

9 BY MR. FEE: 3:21:19PM

10 Q How do you decide which of the PDF 3:21:24PM  
11 documents containing standards were on your Internet 3:21:27PM  
12 Archive collection? 3:21:30PM

13 MR. BRIDGES: Objection, vague and 3:21:34PM  
14 ambiguous. 3:21:34PM

15 THE WITNESS: I tried to get most of the 3:21:35PM  
16 ones that were PDF files that were standards 3:21:37PM  
17 incorporated by reference into that -- that 3:21:40PM  
18 collection. 3:21:42PM

19 BY MR. FEE: 3:21:42PM

20 Q Why did you only post PDF versions of the 3:21:43PM  
21 standards to the Internet Archive? 3:21:47PM

22 MR. BRIDGES: Objection, argumentative, 3:21:49PM  
23 lacks foundation. 3:21:50PM

24 THE WITNESS: The Internet Archive doesn't 3:21:51PM  
25 have an HTML viewing capability. 3:21:53PM

204

1 (Recess taken.) 10:27:40AM

2 THE VIDEOGRAPHER: We're back on the 3:48:01PM

3 record. The time is 3:48 p.m. This marks the 3:48:02PM

4 beginning of Disc No. 3 in the deposition of Carl 3:48:07PM

5 Malamud. 3:48:09PM

6 BY MR. FEE: 3:48:10PM

7 Q Mr. Malamud, before you posted any copies 3:48:14PM

8 of the plaintiffs' standards at issue on the Public 3:48:19PM

9 Resource website, did you obtain the consent of any 3:48:23PM

10 of the plaintiffs? 3:48:27PM

11 MR. BRIDGES: Objection, argumentative. 3:48:28PM

12 THE WITNESS: No. 3:48:32PM

13 BY MR. FEE: 3:48:32PM

14 Q Did you attempt to get the consent of any 3:48:33PM

15 of the plaintiffs? 3:48:36PM

16 MR. BRIDGES: Same objections, 3:48:38PM

17 argumentative, vague and ambiguous. 3:48:38PM

18 THE WITNESS: I talked to at least one of 3:48:40PM

19 the plaintiffs, NFPA. 3:48:43PM

20 BY MR. FEE: 3:48:45PM

21 Q Did you ask for NFPA's permission to post 3:48:45PM

22 the standards on the website? 3:48:48PM

23 MR. BRIDGES: Objection, argumentative. 3:48:51PM

24 THE WITNESS: We discussed broader 3:48:52PM

25 availability of standards and the issues that were 3:48:54PM

205

1 involved. 3:48:56PM

2 BY MR. FEE: 3:48:57PM

3 Q But you don't contend that NFPA consented 3:48:57PM

4 to your posting of the standards on your website, 3:48:59PM

5 correct? 3:49:04PM

6 MR. BRIDGES: Objection. To the extent it 3:49:05PM

7 calls for a legal conclusion or position in this 3:49:06PM

8 lawsuit, that's going to be attorney -- that's 3:49:08PM

9 going to be legal opinion and attorney-client 3:49:10PM

10 privileged and attorney work product. If you want 3:49:15PM

11 to ask what Public Resource's public statements 3:49:18PM

12 have been outside the context of this litigation, 3:49:21PM

13 feel free, but I'm going to instruct him not to 3:49:24PM

14 talk about what the positions are taken by the 3:49:27PM

15 counsel in the lawsuit. 3:49:30PM

16 BY MR. FEE: 3:49:31PM

17 Q You're instructing him not answer whether 3:49:32PM

18 or not NFPA granted consent to the posting of those 3:49:34PM

19 standards on Mr. Malamud's website on the grounds of 3:49:37PM

20 privilege? 3:49:41PM

21 MR. BRIDGES: I don't think that's what 3:49:41PM

22 the question -- maybe I'm wrong, but could the 3:49:41PM

23 court reporter please reread the question? 3:49:42PM

24 THE REPORTER: Okay. 3:49:45PM

25 (The reporter read the record 3:49:45PM

206

1 as requested.) 9:21:04AM

2 MR. BRIDGES: Oh, okay. All right. 3:50:07PM

3 It's -- it's argumentative and vague and ambiguous. 3:50:07PM

4 THE WITNESS: No. 3:50:12PM

5 MS. RUBEL: 43? 3:51:22PM

6 THE REPORTER: 43. 3:51:23PM

7 (Exhibit 43 marked for identification.) 3:51:24PM

8 BY MR. FEE: 3:51:26PM

9 Q Mr. Malamud, I'm going to hand you what's 3:51:26PM

10 been marked as Exhibit 43. It is a spreadsheet. On 3:51:29PM

11 the first page it has headers of downloads, 3:51:36PM

12 identifier and title. 3:51:38PM

13 Can you identify what Exhibit 43 is? 3:52:15PM

14 A No. What is this document? 3:52:17PM

15 Q This is a document that was produced in -- 3:52:19PM

16 by your -- your counsel in connection with this 3:52:19PM

17 case. 3:52:22PM

18 A Okay. 3:52:22PM

19 Q So what I -- I don't know what this is, 3:52:24PM

20 obviously, that's why I'm asking, but in the 3:52:30PM

21 left-hand column you see a reference to downloads. 3:52:33PM

22 At some point in time did you try to create a 3:52:35PM

23 spreadsheet that identified the number of downloads 3:52:39PM

24 of various ASTM standards from your website? 3:52:41PM

25 A You know, I don't recall this document. 3:52:44PM

207

1 Do you have a date? 3:52:58PM

2 Q This is the document as it was produced. 3:53:00PM

3 It's a -- it was produced as an Excel spreadsheet 3:53:02PM

4 with just this data in it, I believe. The Bates 3:53:06PM

5 label for the record is PRO 0023265. 3:53:08PM

6 A So when I see the word "identifier," that 3:53:17PM

7 tells me that this is data obtained from the 3:53:21PM

8 Internet Archive search engine. 3:53:23PM

9 Q Did you at some point in time attempt to 3:53:29PM

10 determine how many downloads there were from the 3:53:31PM

11 Internet Archive website of standards that you had 3:53:35PM

12 posted to the Internet Archive website? 3:53:39PM

13 MR. BRIDGES: Objection, vague and 3:53:41PM

14 ambiguous. 3:53:41PM

15 THE WITNESS: Yes, I did. 3:53:43PM

16 BY MR. FEE: 3:53:48PM

17 Q Is that what defendant's exhibit -- or 3:53:48PM

18 what Exhibit 43 is? 3:53:48PM

19 MR. BRIDGES: Objection, may call for 3:53:51PM

20 speculation, competence. 3:53:52PM

21 THE WITNESS: It would require speculation 3:53:53PM

22 on my part, that's certain. Yes. 3:53:55PM

23 BY MR. FEE: 3:53:57PM

24 Q Are you able to identify how many times 3:54:59PM

25 any particular ASTM standard that you posted to the 3:55:02PM

208

1 Internet Archive had been downloaded by individuals 3:55:05PM  
2 at the Internet Archive website? 3:55:09PM

3 MR. BRIDGES: Objection, competence, calls 3:55:13PM  
4 for speculation, vague and ambiguous. 3:55:14PM

5 THE WITNESS: I can run the advanced 3:55:18PM  
6 search query and ask for the download identifier 3:55:19PM  
7 and title fields from the Internet Archive. 3:55:22PM

8 BY MR. FEE: 3:55:26PM

9 Q And you had done that before in connection 3:55:27PM  
10 with this matter? 3:55:29PM

11 A Yes. 3:55:31PM

12 Q But you're not sure if Exhibit 43 is the 3:55:33PM  
13 end result of that search? 3:55:35PM

14 A I -- I have no idea if this is 3:55:37PM  
15 intermediate work product, what the date is. I 3:55:39PM  
16 don't know. 3:55:42PM

17 BY MR. FEE: 3:55:52PM

18 Q I'm going to hand you a spreadsheet that 3:55:52PM  
19 was produced in native format as PRO 00345530. It's 3:55:55PM  
20 going to be marked as Exhibit 44. 3:56:03PM

21 (Exhibit 44 marked for identification.) 3:56:09PM

22

23 BY MR. FEE: 3:56:09PM

24 Q Can you identify Exhibit 44? 3:56:48PM

25 A This appears to be an initial stats run on 3:56:50PM

224

1 an HTML version that was produced in conjunction 4:31:36PM

2 with HTC and -- and yourself; is that correct? 4:31:40PM

3 MR. BRIDGES: If he's asking about the 4:31:46PM

4 whole document, then make sure that you understand 4:31:47PM

5 the whole document and answer the question. 4:31:50PM

6 THE WITNESS: Uh-huh. Yes. 4:31:52PM

7 BY MR. REHN: 4:31:57PM

8 Q And -- and when -- and the other link 4:31:59PM

9 would generally be a link to a PDF, and -- and the 4:32:01PM

10 way that that PDF was made was you scanned the 4:32:08PM

11 standard as it was purchased, ran OCR and uploaded 4:32:11PM

12 that with your cover page attached as well? 4:32:16PM

13 A Yes. 4:32:19PM

14 Q And the cover page has a representation 4:32:19PM

15 these standards have been incorporated by reference; 4:32:22PM

16 is that right? 4:32:25PM

17 A Yes, sir. 4:32:29PM

18 Q Now, when we see examples of standards 4:32:30PM

19 where there's only one link, like if you'll turn to 4:32:34PM

20 the second page of this document, you'll look, for 4:32:37PM

21 example, in Connecticut and you'll see in the 4:32:40PM

22 electrical column there's the NEC 2005. Do you see 4:32:43PM

23 that? 4:32:49PM

24 A Yes, I do. 4:32:49PM

25 Q In that case, do you know which -- do you 4:32:51PM

254

1 Q Including downloading a copy of the 5:04:22PM  
2 standards that are listed here? 5:04:23PM

3 MR. BRIDGES: Objection, lacks foundation, 5:04:25PM  
4 assumes facts not in evidence, vague and ambiguous. 5:04:26PM

5 THE WITNESS: You can view the object and, 5:04:29PM  
6 yes, they do have a download button. 5:04:33PM

7 BY MR. REHN: 5:04:36PM

8 Q So you could, for example, download a copy 5:04:36PM  
9 to your desktop on your computer at home? 5:04:38PM

10 MR. BRIDGES: Objection, hypothetical and 5:04:41PM  
11 assumes facts not in evidence. 5:04:45PM

12 THE WITNESS: Yes. 5:04:47PM

13 BY MR. REHN: 5:04:47PM

14 Q If you can take a quick look at another 5:04:48PM  
15 document. I think this will be No. 50. Sorry. 5:04:52PM  
16 Wide table here. 5:05:39PM

17 (Exhibit 50 marked for identification.) 11:31:26AM

18 BY MR. REHN:

19 Q And Exhibit 50 has a column marked 5:05:46PM  
20 downloads, then a column marked identifier and a 5:05:50PM  
21 column marked title; is that correct. 5:05:53PM

22 MR. BRIDGES: You're asking about the 5:05:57PM  
23 exhibit paper itself, I assume? Otherwise, I'm 5:05:59PM  
24 objecting. 5:06:03PM

25 THE WITNESS: That's what this piece of 5:06:04PM

255

1 paper says, yes. 5:06:05PM

2 BY MR. REHN: 5:06:06PM

3 Q And I can represent to you that this is a 5:06:07PM

4 document that Public Resource produced to the 5:06:09PM

5 plaintiffs in this litigation. 5:06:12PM

6 MR. BRIDGES: Do you have a Bates number 5:06:14PM

7 on that, since this doesn't? 5:06:15PM

8 MR. REHN: Hold on. I e-mailed it to 5:06:18PM

9 Kevin. It's the first one e-mailed to you today. 5:06:21PM

10 It should be like one page. 5:06:53PM

11 MR. FEE: PRO 00232652, 232652. 5:07:02PM

12 MR. BRIDGES: Thank you. 5:07:15PM

13 BY MR. REHN: 5:07:20PM

14 Q But have you seen this document before? 5:07:20PM

15 A Yes. 5:07:25PM

16 Q You have seen this document before today? 5:07:27PM

17 A I have seen the data on this document. 5:07:34PM

18 Q And what's your understanding of what that 5:07:37PM

19 data represents? 5:07:40PM

20 A It's the result of an advanced query on 5:07:42PM

21 the search interface for the Internet Archive with 5:07:45PM

22 three pieces of data returned, the number of 5:07:48PM

23 downloads, the identifier and the title of -- 5:07:50PM

24 THE REPORTER: I'm sorry. The three 5:07:50PM

25 pieces of data returned... 5:07:50PM

256

1 THE WITNESS: Which include the downloads, 5:07:55PM  
2 the identifier and the title. 5:07:55PM

3 THE REPORTER: Thank you. 5:07:58PM

4 BY MR. REHN: 5:07:59PM

5 Q Did you run that query? 5:08:02PM

6 A Yes. 5:08:03PM

7 Q To produce this data? 5:08:04PM

8 A Yes. 5:08:06PM

9 Q Do you remember when you ran that query? 5:08:06PM

10 A No. 5:08:09PM

11 Q Could you give me a -- was it six months 5:08:10PM

12 ago, a year ago? Do you have any rough ballpark 5:08:14PM

13 recollection? 5:08:18PM

14 A January 2014 is my rough recollection. 5:08:20PM

15 Q So a little over a year ago? 5:08:24PM

16 A Correct. 5:08:26PM

17 Q And your understanding is that as of that 5:08:27PM

18 date, this represents the number of times each of 5:08:29PM

19 these standards have been downloaded on the Internet 5:08:32PM

20 Archive website? 5:08:34PM

21 MR. BRIDGES: Objection, may call 5:08:39PM

22 speculation, assumes facts not in evidence, lacks 5:08:41PM

23 foundation. 5:08:42PM

24 THE WITNESS: Download is a very imprecise 5:08:43PM

25 term. It's -- it's what the Internet Archive says 5:08:45PM

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1 how it was typed in -- 5:22:52PM

2 THE REPORTER: -- in the transcription. 5:22:52PM

3 MR. REHN: I'll just repeat the question. 5:22:58PM

4 BY MR. REHN: 5:22:59PM

5 Q Between -- on Rows 2 through 24 in the 5:22:59PM

6 identifier column, each identifier begins 5:23:01PM

7 gov.law.nfpa and is followed by the number of the 5:23:04PM

8 standard; is that correct? 5:23:12PM

9 MR. BRIDGES: You're talking about the 5:23:13PM

10 document? I'll -- I'll object to the extent that 5:23:15PM

11 you're asking a question beyond what is stated on 5:23:16PM

12 this document. 5:23:20PM

13 THE WITNESS: It is Rows 2 through 25, not 5:23:23PM

14 Rows 2 through 24, and some of the identifiers have 5:23:26PM

15 a number and some say NEC. 5:23:32PM

16 BY MR. REHN: 5:23:36PM

17 Q Right. So, for example, in Row 12 it 5:23:37PM

18 says, gov.law.nfpa.NEC.2011. 5:23:40PM

19 A That is, in fact, what it says. 5:23:47PM

20 Q And then on Row 26, what does the 5:23:50PM

21 identifier say there? 5:23:52PM

22 MR. BRIDGES: By the way, objection, lack 5:23:59PM

23 of foundation, assumes facts not in evidence, vague 5:24:00PM

24 and ambiguous. 5:24:02PM

25 THE WITNESS: It says, NFPA.NEC.2014. 5:24:04PM

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1 BY MR. REHN: 5:24:09PM

2 Q And is it your understanding that is the 5:24:10PM

3 identifier you used when you uploaded that 5:24:10PM

4 particular document to the Internet Archive website? 5:24:13PM

5 MR. BRIDGES: Objection, lacks foundation, 5:24:16PM

6 assumes facts not in evidence and argumentative, 5:24:17PM

7 vague and ambiguous. 5:24:21PM

8 THE WITNESS: It apparently is. 5:24:30PM

9 BY MR. REHN: 5:24:32PM

10 Q I'd invite you just to scroll through this 5:24:32PM

11 document. Are there any other standards listed in 5:24:36PM

12 this document that do not begin gov.law? 5:24:38PM

13 MR. BRIDGES: I'm sorry. Can you -- can I 5:25:02PM

14 have the court reporter repeat the question? 5:25:02PM

15 (The reporter read the record 5:25:02PM

16 as requested.) 9:21:04AM

17 MR. BRIDGES: Objection, misleading, lacks 5:25:03PM

18 foundation, mischaracterizes testimony, I think. 5:25:05PM

19 And if it presumes to be based on earlier 5:25:09PM

20 testimony, argumentative and vague and ambiguous. 5:25:14PM

21 THE WITNESS: All of the identifiers in 5:25:19PM

22 Column A, with the exception of Row 26, begin with 5:25:21PM

23 gov.law. 5:25:25PM

24 BY MR. REHN: 5:25:29PM

25 Q So do you know why you picked a different 5:25:29PM

271

1 (Recess taken.) 10:27:40AM

2 THE VIDEOGRAPHER: We're back on the 5:40:19PM

3 record. The time is 5:41 p.m. This marks the 5:40:23PM

4 beginning of Disc No. 4 in the deposition of Carl 5:40:27PM

5 Malamud. 5:40:30PM

6 BY MR. REHN: 5:40:31PM

7 Q Could I just ask you to clarify again what 5:40:31PM

8 your understanding of the word "access" is -- is, as 5:40:34PM

9 we've been discussing it? 5:40:38PM

10 MR. BRIDGES: Objection to the extent it's 5:40:41PM

11 not in the context of a particular question, vague 5:40:42PM

12 and ambiguous, lacks foundation. 5:40:46PM

13 THE WITNESS: I can tell you what access 5:40:48PM

14 means in the context of the web server that I 5:40:50PM

15 operate. 5:40:52PM

16 BY MR. REHN: 5:40:53PM

17 Q Sure. 5:40:53PM

18 A Access is an HTTP GET request from a 5:40:55PM

19 client, G-E-T, which returns data successfully that 5:41:01PM

20 the client had asked for. 5:41:08PM

21 Q So it means that -- when you say "client," 5:41:11PM

22 you mean somebody who is using your website, 5:41:14PM

23 somebody who is on the Internet and goes to your 5:41:16PM

24 website? Is that what you mean by the word "client" 5:41:19PM

25 in that -- 5:41:23PM

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1 MR. BRIDGES: Objection, lacks foundation. 5:41:24PM

2 THE WITNESS: I mean another computer on 5:41:26PM

3 the Internet that contacts the HTTP server on my 5:41:27PM

4 computer. 5:41:31PM

5 BY MR. REHN: 5:41:32PM

6 Q So when that other computer receives 5:41:32PM

7 information from your server that they've requested, 5:41:35PM

8 that's an access? 5:41:38PM

9 A The way I count accesses is I look for a 5:41:42PM

10 status code 200, which is a complete transfer of the 5:41:46PM

11 requested file, or a series of access codes 206, 5:41:51PM

12 which are partial transfers as used on, for example, 5:41:57PM

13 a mobile phone that gets a piece of a document, then 5:42:01PM

14 another piece, then another piece. 5:42:05PM

15 Q And when you have the series of transfers, 5:42:08PM

16 you only count it as an access if they sum to the 5:42:10PM

17 entire document? 5:42:14PM

18 A No. 5:42:15PM

19 MR. BRIDGES: Objection, mischaracterizes 5:42:17PM

20 his testimony. 5:42:19PM

21 THE WITNESS: The way I count it is very 5:42:20PM

22 specific. It is the number of 200 or 206 status 5:42:27PM

23 codes by a unique IP address to a unique document 5:42:31PM

24 within a given hour. 5:42:35PM

25 BY MR. REHN: 5:42:45PM

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1 MR. BRIDGES: Objection, lacks foundation, 5:43:48PM  
2 vague and ambiguous. 5:43:49PM

3 THE WITNESS: I know that some people 5:43:50PM  
4 count unique accesses over a 24-hour period, not a 5:43:51PM  
5 one-hour period, so I think I'm actually being more 5:43:56PM  
6 conservative. 5:43:58PM

7 BY MR. REHN: 5:44:00PM

8 Q And do you -- is it your understanding 5:44:00PM  
9 that the Internet Archive's method for counting 5:44:01PM  
10 accesses is similar to what you've described? 5:44:05PM

11 MR. BRIDGES: Objection, competence, lacks 5:44:09PM  
12 foundation, may call for speculation, vague and 5:44:09PM  
13 ambiguous. 5:44:09PM

14 THE WITNESS: My understanding is that 5:44:13PM  
15 they count over a 24-hour period. 5:44:14PM

16 BY MR. REHN: 5:44:16PM

17 Q I'm going to hand you what we're marking 5:44:16PM  
18 as Exhibit No. 52. 5:44:29PM

19 (Exhibit 52 marked for identification.) 5:44:59PM

20 BY MR. REHN: 5:44:59PM

21 Q Do you recognize this document? 5:44:59PM

22 A I certainly did not produce it. 5:45:00PM

23 Q Do you recognize what it is? 5:45:03PM

24 MR. BRIDGES: Objection, lacks foundation, 5:45:05PM  
25 vague and ambiguous. 5:45:05PM

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1 THE WITNESS: It's possible it's a screen 5:45:07PM  
2 dump from the Internet Archive. 5:45:10PM

3 BY MR. REHN: 5:45:13PM

4 Q What do you mean by "screen dump"? 5:45:13PM

5 A It looks like somebody accessed a -- a URL 5:45:18PM  
6 and hit the print command in this case. 5:45:22PM

7 Q So does -- does this appear to be the URL 5:45:25PM  
8 where the 2011 National Electrical Code is on the 5:45:28PM  
9 Internet Archive? 5:45:32PM

10 A Yes. 5:45:36PM

11 Q And I can represent to you -- 5:45:37PM

12 MR. BRIDGES: I'm sorry. I need more time 5:45:39PM  
13 to object. I am going to object on the basis of 5:45:39PM  
14 vague and ambiguous. 5:45:41PM

15 BY MR. REHN: 5:45:45PM

16 Q Well, I can represent to you that you got 5:45:46PM  
17 it right. This is the Internet Archive page where 5:45:47PM  
18 the 2011 National Electrical Code is available. It 5:45:51PM  
19 was accessed yesterday at 11:35 a.m. And there's a 5:45:54PM  
20 box kind of in the center of the page, and in that 5:46:03PM  
21 box we can see a -- a graphic that says, "notice of 5:46:07PM  
22 incorporation." Do you see that? 5:46:10PM

23 A Yes, I do. 5:46:13PM

24 Q And do you recognize what that is? 5:46:14PM

25 A It looks like my standard cover page for 5:46:19PM

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1 THE WITNESS: They can access this 5:47:29PM  
2 document in a variety of formats. 5:47:30PM

3 BY MR. REHN: 5:47:33PM

4 Q And by "access," that would encompass the 5:47:33PM  
5 possibility of downloading a copy of the standard to 5:47:36PM  
6 their own computer? 5:47:40PM

7 MR. BRIDGES: Objection, argumentative, 5:47:41PM  
8 lacks foundation, assumes facts not in evidence, 5:47:42PM  
9 vague and ambiguous. 5:47:44PM

10 THE WITNESS: "Download" is simply not a 5:47:46PM  
11 term that -- it's just not a very precise term. 5:47:49PM  
12 "Access" is the term that I understand and it's 5:47:52PM  
13 when a computer on the Internet accesses an HTTP 5:47:54PM  
14 server on the Internet. 5:47:57PM

15 BY MR. REHN: 5:47:59PM

16 Q Okay. Is it your understanding that a 5:47:59PM  
17 user of a computer on the Internet can go to this 5:48:02PM  
18 web page and obtain a PDF version of this document, 5:48:05PM  
19 save it to their desktop, from which they can then 5:48:10PM  
20 use it as they see fit, without even being connected 5:48:16PM  
21 to the Internet in the future? 5:48:21PM

22 MR. BRIDGES: Lacks foundation, assumes 5:48:23PM  
23 facts not in evidence, vague and ambiguous, 5:48:24PM  
24 hypothetical. 5:48:25PM

25 THE WITNESS: Are -- are you asking 5:48:30PM

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1 whether that capability is possible? 5:48:31PM

2 BY MR. REHN: 5:48:34PM

3 Q Yes, using these links here. 5:48:34PM

4 MR. BRIDGES: Objection, may call for 5:48:38PM

5 speculation, may lack knowledge. 5:48:39PM

6 THE WITNESS: It's theoretically possible, 5:48:42PM

7 yes. 5:48:44PM

8 BY MR. REHN: 5:48:45PM

9 Q So -- so -- and that same user, having 5:48:45PM

10 that -- a copy of that document saved on their 5:48:47PM

11 desktop, could, say, print a copy of that document 5:48:50PM

12 if they have a printer attached to their computer? 5:48:54PM

13 MR. BRIDGES: Objection, hypothetical, 5:48:59PM

14 lacks foundation, assumes facts not in evidence, 5:48:59PM

15 vague and ambiguous. 5:49:00PM

16 THE WITNESS: On -- on some computers, 5:49:04PM

17 yes. 5:49:04PM

18 BY MR. REHN: 5:49:06PM

19 Q And on those computers from which people 5:49:06PM

20 can print PDFs that are saved to their desktop, they 5:49:09PM

21 can print as many copies as they like? 5:49:13PM

22 MR. BRIDGES: Objection, hypothetical, 5:49:16PM

23 lacks foundation, vague and ambiguous, 5:49:16PM

24 argumentative. 5:49:19PM

25 THE WITNESS: It's -- it's very 5:49:22PM

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1 hypothetical. It's if -- if you have a printer on 5:49:22PM

2 your computer, you can print a piece of paper. 5:49:24PM

3 BY MR. REHN: 5:49:27PM

4 Q And if you have a file that you've 5:49:28PM

5 accessed and saved to your desktop from the Internet 5:49:30PM

6 but is now saved on your computer, you can print 5:49:34PM

7 multiple copies of that file? 5:49:37PM

8 MR. BRIDGES: Objection, assumes many 5:49:40PM

9 facts not in evidence, lacks foundation, 5:49:41PM

10 hypothetical, vague and ambiguous. 5:49:44PM

11 THE WITNESS: I believe you accessed a URL 5:49:47PM

12 on the Internet and printed a file, so I would say 5:49:51PM

13 yes, you certainly were capable of doing that. 5:49:54PM

14 MR. BRIDGES: Let the record reflect that 5:49:57PM

15 the client was holding Exhibit 52 up in the air in 5:49:57PM

16 context with that response. 5:50:04PM

17 BY MR. REHN: 5:50:10PM

18 Q If we could go and look at the information 5:50:10PM

19 underneath that box in the center, is that 5:50:13PM

20 information that you entered when you uploaded this 5:50:18PM

21 document to the Internet Archive website? For 5:50:22PM

22 example, where it says "description" and then it 5:50:26PM

23 says "legally binding document," would that be 5:50:28PM

24 information you entered? 5:50:30PM

25 MR. BRIDGES: Objection, vague and 5:50:32PM

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1       ambiguous. Are you asking specifically about the       5:50:33PM  
2       description?       5:50:37PM

3               MR. REHN: We'll start with the       5:50:38PM  
4       description.       5:50:40PM

5               THE WITNESS: Yes.       5:50:42PM

6       BY MR. REHN:       5:50:43PM

7               Q       And we'll just go through it. Where it       5:50:49PM  
8       says author, National Fire Protection Association,       5:50:52PM  
9       did you enter that information?       5:50:56PM

10              A       Yes.       5:50:59PM

11              Q       When you -- I believe it -- was it the APC       5:51:01PM  
12       call? What was it?       5:51:06PM

13              A       API, application programming interface.       5:51:07PM

14              Q       API call. So when you use the API, does       5:51:11PM  
15       it give you an option to enter an author? Is that       5:51:14PM  
16       one of the options that are identified there?       5:51:16PM

17              A       You can specify any piece of metadata and       5:51:21PM  
18       a value associated with that metadata.       5:51:25PM

19              Q       And you identified National Fire       5:51:29PM  
20       Protection Association as the author of this       5:51:31PM  
21       document?       5:51:33PM

22              A       I did.       5:51:35PM

23              Q       So -- and that was consistent with your       5:51:37PM  
24       understanding that the NFPA is the author of the       5:51:39PM  
25       2011 NEC?       5:51:41PM

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1 MR. BRIDGES: Objection, calls for a legal 5:51:44PM  
2 conclusion, lacks -- calls for a legal opinion, 5:51:45PM  
3 assumes facts not in evidence, lacks foundation, 5:51:48PM  
4 vague and ambiguous. 5:51:50PM

5 THE WITNESS: I don't know the precise 5:51:54PM  
6 meaning of the term "author." They were certainly 5:51:56PM  
7 the source of this document. 5:51:59PM

8 BY MR. REHN: 5:52:04PM

9 Q But you identified them as the author 5:52:04PM  
10 here. 5:52:06PM

11 MR. BRIDGES: Objection, asked and 5:52:07PM  
12 answered. 5:52:08PM

13 THE WITNESS: Just as you discussed 5:52:10PM  
14 "downloads" as a term. Yes, I -- I use the word 5:52:12PM  
15 "author." 5:52:16PM

16 BY MR. REHN: 5:52:16PM

17 Q So it was your understanding when you 5:52:17PM  
18 uploaded this document that the NFPA was the author 5:52:18PM  
19 of this document? 5:52:21PM

20 MR. BRIDGES: Objection, asked and 5:52:22PM  
21 answered and calls for a legal conclusion, lacks 5:52:23PM  
22 foundation, assumes facts not in evidence, vague 5:52:27PM  
23 and ambiguous. 5:52:29PM

24 THE WITNESS: I put the word "author," a 5:52:30PM  
25 colon and National Fire Protection Association. As 5:52:32PM

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1 to the technical meaning of the term "author," 5:52:36PM

2 that's -- you folks are lawyers. 5:52:39PM

3 BY MR. REHN: 5:52:41PM

4 Q Sure. But just in the way you understand 5:52:41PM

5 the term, that's what -- you understood that NFPA 5:52:43PM

6 was the author? 5:52:44PM

7 MR. BRIDGES: Objection, misstates 5:52:45PM

8 testimony, calls for a legal conclusion, lacks 5:52:47PM

9 foundation, vague and ambiguous. 5:52:50PM

10 THE WITNESS: I put the word "author," 5:52:51PM

11 colon and National Fire Protection Association. 5:52:53PM

12 BY MR. REHN: 5:53:09PM

13 Q And if we could turn to the next page, 5:53:09PM

14 you'll see a section titled, "Selected Metadata." 5:53:11PM

15 A Yes, I see that. 5:53:24PM

16 Q And do you see a -- a line that says, 5:53:24PM

17 "credits"? 5:53:26PM

18 A I do. 5:53:30PM

19 Q And what does that say? 5:53:32PM

20 A It was uploaded by Public.Resource.Org. 5:53:33PM

21 Q And do you always put that credits line in 5:53:38PM

22 documents that you upload to the Internet Archive? 5:53:41PM

23 MR. BRIDGES: Objection, argumentative. 5:53:44PM

24 THE WITNESS: I don't know if I always do. 5:53:46PM

25 BY MR. REHN: 5:53:47PM

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1 creator of this object was not asserting any 5:58:59PM

2 rights. 5:59:03PM

3 BY MR. REHN: 5:59:04PM

4 Q What do you mean by "creator of this 5:59:04PM

5 object"? 5:59:06PM

6 A The person who exercised the API call that 5:59:06PM

7 resulted in the creation of this identifier; me in 5:59:09PM

8 this case. 5:59:16PM

9 Q I'm going to mark Exhibit 53. 5:59:47PM

10 (Exhibit 53 marked for identification.) 11:31:26AM

11 BY MR. REHN: 11:31:26AM

12 Q Do you recognize this document?

13 A It appears to be an Internet Archive 6:00:23PM

14 screen dump like your previous exhibit. 6:00:27PM

15 Q And this one is for the 2014 National 6:00:30PM

16 Electrical Code; is that right? 6:00:36PM

17 A That is what it appears to be, yes. 6:00:39PM

18 Q Now, this is -- looks pretty similar to 6:00:41PM

19 Exhibit 52. Would you agree with that? 6:00:45PM

20 MR. BRIDGES: Objection, lacks foundation, 6:00:48PM

21 vague and ambiguous. 6:00:49PM

22 THE WITNESS: There are some similarities. 6:00:55PM

23 BY MR. REHN: 6:00:57PM

24 Q Like there's the box in the middle and 6:00:58PM

25 then there's options for how to view the book on the 6:01:00PM

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1 left? 6:01:03PM

2 A Yes. 6:01:04PM

3 Q And then there's some information below 6:01:05PM

4 the box in the middle such as author, subject and so 6:01:08PM

5 forth? 6:01:14PM

6 MR. BRIDGES: Objection, lacks foundation, 6:01:14PM

7 vague and ambiguous. 6:01:16PM

8 THE WITNESS: Yes. 6:01:22PM

9 BY MR. REHN: 6:01:24PM

10 Q And you put that information in this -- in 6:01:26PM

11 this as well when you used the API interface to 6:01:28PM

12 upload this document? 6:01:37PM

13 MR. BRIDGES: Objection, vague and 6:01:38PM

14 ambiguous. 6:01:39PM

15 THE WITNESS: Yes. 6:01:40PM

16 BY MR. REHN: 6:01:42PM

17 Q So again, you have -- you -- you chose to 6:01:43PM

18 identify the author as National Fire Protection 6:01:44PM

19 Association? 6:01:47PM

20 MR. BRIDGES: Objection. To the extent 6:01:51PM

21 you're asking him a question with significance of 6:01:52PM

22 legal terms, I'll object on the ground that it 6:01:55PM

23 calls for a legal opinion. 6:01:57PM

24 THE WITNESS: Once again, I put the 6:02:00PM

25 identifier author, colon, and National Fire 6:02:01PM

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1 Protection Association in -- in the HTML. 6:02:03PM

2 BY MR. REHN: 6:02:07PM

3 Q And was -- and that was your understanding 6:02:07PM

4 at the time you uploaded this document, that the 6:02:09PM

5 National Fire Protection Association was the author 6:02:11PM

6 as you would use that word? 6:02:14PM

7 MR. BRIDGES: Objection, vague and 6:02:17PM

8 ambiguous, calls -- may call for a legal 6:02:18PM

9 conclusion, lacks foundation, assumes facts not in 6:02:19PM

10 evidence. 6:02:22PM

11 THE WITNESS: Again, I use the label 6:02:24PM

12 author and a colon and National Fire Protection 6:02:26PM

13 Association. 6:02:28PM

14 BY MR. REHN: 6:02:31PM

15 Q And you -- you chose the word "author"? 6:02:32PM

16 A Yes. 6:02:34PM

17 Q And then under subject, there's a few 6:02:34PM

18 things listed, and the first one -- what is the 6:02:38PM

19 first one there? 6:02:41PM

20 MR. BRIDGES: Objection, vague and 6:02:43PM

21 ambiguous. 6:02:44PM

22 THE WITNESS: Subject, colon, required in 6:02:46PM

23 all 50 states, Public Safety Code, legally binding 6:02:48PM

24 document. 6:02:52PM

25 BY MR. REHN: 6:02:52PM

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1 MR. BRIDGES: And you need to review the 6:20:14PM  
2 document if you're going to answer that question. 6:20:16PM

3 And I'll object on the -- to the question 6:20:23PM  
4 as vague and ambiguous. 6:20:26PM

5 Read the whole document, please. 6:20:41PM

6 THE WITNESS: The statements by Man 1 do, 6:21:16PM  
7 in fact, represent my views. 6:21:17PM

8 BY MR. REHN: 6:21:20PM

9 Q And did you make the decision that this 6:21:21PM  
10 video should be posted on Public Resource's website? 6:21:22PM

11 A Yes. 6:21:26PM

12 Q And do the statements by you in this 6:21:26PM  
13 document represent the views of Public Resource? 6:21:28PM

14 A Yes. 6:21:33PM

15 Q So let's take a look at the page 6:21:33PM  
16 Bates-stamped 167544. And it's your view that the 6:21:42PM  
17 National Fire Protection Association does amazing 6:21:52PM  
18 work and saves lives? 6:21:57PM

19 A Yes, I said that. 6:21:58PM

20 Q And it's your view that the National Fire 6:21:59PM  
21 Protection Association protects the lives of 6:22:01PM  
22 volunteer firefighters? 6:22:04PM

23 MR. BRIDGES: Objection. That misstates 6:22:13PM  
24 the document. 6:22:14PM

25 THE WITNESS: No, that's not what I say on 6:22:15PM

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1 this page. 6:22:17PM

2 BY MR. REHN: 6:22:17PM

3 Q It's your view that the National Fire 6:22:18PM

4 Protection Association's standards for fire 6:22:20PM

5 sprinklers, standards for fire hydrants, standards 6:22:22PM

6 for foam, standards for life safety protect lives of 6:22:27PM

7 our volunteer firefighters. 6:22:28PM

8 A Oh. Yes. 6:22:31PM

9 Q And do you also -- would you also take the 6:22:32PM

10 view that National Fire Protection itself protects 6:22:33PM

11 the lives of volunteer firefighters through its 6:22:35PM

12 activities? 6:22:39PM

13 MR. BRIDGES: Objection, argumentative, 6:22:40PM

14 lacks foundation, vague and ambiguous. 6:22:41PM

15 THE WITNESS: I can't speak to that. I -- 6:22:43PM

16 the standards certainly do. 6:22:44PM

17 BY MR. REHN: 6:22:47PM

18 Q And is it your view that the standards 6:22:47PM

19 protect the lives of children? 6:22:49PM

20 A Yes. 6:22:51PM

21 Q And it's your view that it's important 6:22:52PM

22 that organizations like the National Fire Protection 6:22:53PM

23 Association continue to survive? 6:22:55PM

24 A Absolutely. 6:22:59PM

25 Q And would you extend that to other 6:22:59PM

307

1 standards development organizations as well, that 6:23:02PM

2 it's important they continue to survive? 6:23:04PM

3 MR. BRIDGES: Objection, lacks foundation. 6:23:07PM

4 THE WITNESS: Do you have a specific 6:23:08PM

5 standards organization in mind? 6:23:09PM

6 BY MR. REHN: 6:23:11PM

7 Q How about ASTM. 6:23:12PM

8 A I'm a big fan of ASTM. 6:23:14PM

9 Q So it's important they continue to 6:23:17PM  
10 survive? 6:23:18PM

11 MR. BRIDGES: Objection, argumentative. 6:23:19PM

12 THE WITNESS: I think the standards that 6:23:21PM  
13 are -- the subject area of the standards that ASTM 6:23:22PM  
14 works in is very important and we need to continue 6:23:27PM  
15 to have standards in that area. 6:23:30PM

16 BY MR. REHN: 6:23:32PM

17 Q And continue to have organizations that 6:23:32PM  
18 develop standards and keep them up-to-date? 6:23:34PM

19 MR. BRIDGES: Objection, argumentative, 6:23:36PM  
20 lacks foundation. 6:23:37PM

21 THE WITNESS: Yes, I believe standards are 6:23:41PM  
22 important. 6:23:43PM

23 BY MR. REHN: 6:23:43PM

24 Q And would you say the same about the 6:23:43PM  
25 standards of ASHRAE? 6:23:45PM

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1 MR. BRIDGES: Objection, lacks foundation, 6:23:47PM  
2 vague and ambiguous. 6:23:48PM

3 THE WITNESS: I think ASHRAE Standard 90.1 6:23:51PM  
4 is an important standard. 6:23:53PM

5 BY MR. REHN: 6:23:59PM

6 Q Is it your view that standards development 6:24:01PM  
7 organizations need funding to do the work that they 6:24:04PM  
8 do, including standards development? 6:24:07PM

9 MR. BRIDGES: Objection, may call for a 6:24:09PM  
10 lay opinion, vague and ambiguous, and -- 6:24:11PM

11 THE WITNESS: I think -- 6:24:19PM

12 MR. BRIDGES: -- and to the extent it 6:24:19PM  
13 calls for a legal opinion, I would object on that 6:24:21PM  
14 basis. 6:24:25PM

15 THE WITNESS: I would want to analyze the 6:24:25PM  
16 specific standards body and their funding sources 6:24:26PM  
17 and the work that they do. 6:24:28PM

18 BY MR. REHN: 6:24:31PM

19 Q Can you read the first sentence of that 6:24:33PM  
20 paragraph that begins with, Man 1 804, the sentence 6:24:34PM  
21 following Man 1 804? 6:24:38PM

22 A "Our goal is here to publish a law to 6:24:40PM  
23 establish the principle that the law become 6:24:43PM  
24 available, but then government should take this over 6:24:46PM  
25 and figure out a way to make the law available and 6:24:49PM

**MATERIAL UNDER SEAL DELETED**

**JA602-JA705**

# EXHIBIT 4

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA

-----:  
AMERICAN SOCIETY FOR TESTING :  
AND MATERIALS dba ASTM :  
INTERNATIONAL, :  
NATIONAL FIRE PROTECTION :  
ASSOCIATION, INC., and :  
AMERICAN SOCIETY OF HEATING, :  
REFRIGERATING AND AIR :  
CONDITIONING ENGINEERS, :  
: :  
Plaintiffs/ :  
Counter-Defendants, :  
: :  
v. : No. 1:13-cv-01215-EGS  
: :  
PUBLIC.RESOURCE.ORG, :  
: :  
Defendant/ :  
Counter-Plaintiff. :  
-----:

Coos Bay, Oregon

Thursday, November 13, 2014

39(b) (6) DEPOSITION OF:

REBECCA MALAMUD,  
PUBLIC.RESOURCE.ORG,

taken pursuant to notice, by counsel for Plaintiffs/  
Counter-Defendants at Red Lion Inn, 1313 North  
Bayshore Drive, Coos Bay, Oregon, before Jan R.  
Duiven, CSR, FCRR, CCP, Certified Shorthand Reporter  
in and for the State of Oregon, beginning at 9:00  
a.m., when were present on behalf of the respective  
parties:

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1 MR. STOLTZ: Objection to form. 09:48:11

2 "Core group." 09:48:14

3 BY MR. FEE: 09:48:15

4 Q. Have you ever used the phrase "core 09:48:15

5 group" in connection with Rural Design Collective 09:48:17

6 before? 09:48:20

7 A. This year. 09:48:20

8 Q. Have you used the phrase "core group"? 09:48:20

9 A. Yes. 09:48:23

10 Q. Okay. What does that mean? 09:48:23

11 A. It just -- most of the people working 09:48:27

12 this summer were that age. 09:48:37

13 Q. Okay. You're comfortable using the 09:48:40

14 word "core group" in connection with this business 09:48:42

15 of yours? Your counsel objected. He didn't think 09:48:44

16 you could understand "core group." I just want to 09:48:47

17 make sure you understand the phrase. 09:48:49

18 A. I'm just using it as a phrase. 09:48:54

19 Q. Okay. And just tell me what you meant 09:48:55

20 by "core group." I want to make sure we're all 09:48:58

21 clear here. What did core group mean? 09:49:00

22 A. Most of the mentees this year were in 09:49:02

23 that age group. 09:49:06

24 Q. Okay. So the core group as of 2014 at 09:49:08

25 Rural Design Collective was children ages 7 to 14? 09:49:14

43

1 A. Yes. 09:49:16

2 Q. What was the age range of the core 09:49:17

3 group in 2013? 09:49:20

4 A. Well, we -- like 7 to 35. 09:49:22

5 Q. Okay. Was there one 35-year-old? 09:49:39

6 A. Yes. 09:49:42

7 Q. Okay. Who was the next oldest person 09:49:42

8 in 2013? 09:49:45

9 A. 2013? Probably 14. I don't think I 09:49:47

10 had high school in 2013 -- last year, '14. 09:50:06

11 Q. Who was the 35-year-old mentee of 09:50:22

12 yours that participated in the Rural Design 09:50:24

13 Collective? 09:50:26

14 A. That was Jasper. 09:50:26

15 Q. Did persons in the Rural Design 09:50:31

16 Collective program work on any ASTM or NFPA 09:50:40

17 standards? 09:50:43

18 A. Yes. 09:50:45

19 Q. Do you know which persons in the 09:51:04

20 program worked on the ASTM or NFPA standards? 09:51:07

21 A. Jasper and Levi. 09:51:10

22 Q. So Levi's also part of the Rural 09:51:11

23 Design Collective? 09:51:16

24 A. Yes, but he has graduated. He's -- 09:51:16

25 he's a mentor. 09:51:21

47  
1 of some sort. Correct? 09:55:52  
2 A. Right. 09:55:53  
3 Q. Do the participants pay Point B 09:55:53  
4 anything to be in this program? 09:56:00  
5 A. No. But I -- we have stipends based 09:56:01  
6 on performance. 09:56:08  
7 Q. Point B pays stipends to the 09:56:09  
8 participants? 09:56:12  
9 A. Awards, scholarship funds. 09:56:13  
10 Q. Did any participants in the Rural 09:56:22  
11 Design Collective earn awards or stipends for 09:56:24  
12 their work on NFPA or ASTM standards? 09:56:26  
13 A. No. 09:56:28  
14 Q. What is a standard sprint? 09:56:29  
15 A. We pick an area of public concern that 09:56:54  
16 we were enthusiastic about and convert the 09:57:03  
17 graphics for that topic. 09:57:09  
18 Q. You -- 09:57:16  
19 A. It was intended to be motivational. 09:57:17  
20 It is. 09:57:22  
21 Q. What graphics are you converting with 09:57:26  
22 standard sprint? 09:57:34  
23 A. At the time it was public safety 09:57:35  
24 related to theater accessibility. 09:57:40  
25 Q. Was there only one standard sprint 09:57:45

87

1 (Deposition Exhibit No. 18 11:05:05

2 marked for identification.) 11:05:22

3 BY MR. FEE: 11:05:22

4 Q. Ms. Malamud, I'm going to hand you 11:05:24

5 Exhibit 18, which is a printout of the Rural 11:05:26

6 Design Collective Headquarters Codes of the World 11:05:28

7 Overview and Roadmap. It's six pages. 11:05:31

8 A. Okay. 11:05:33

9 Q. Are you familiar with Exhibit 18? 11:05:38

10 A. Yes. 11:05:39

11 Q. Is this a page from the Rural Design 11:05:40

12 Collective website? 11:05:46

13 A. Yes. 11:05:46

14 Q. Did you author this page? 11:05:47

15 A. Yes, I did. 11:05:49

16 Q. Is everything that's included in this 11:05:50

17 page accurate to the best of your knowledge? 11:05:53

18 A. Yes. 11:05:56

19 Q. I have no other questions about that. 11:05:56

20 MR. STOLTZ: You can put it aside. 11:06:06

21 THE WITNESS: Okay. 11:06:08

22 BY MR. FEE: 11:06:10

23 Q. At some point in time do you recall 11:06:14

24 having a series of communications with Carl 11:06:16

25 Malamud regarding whether or not you were 11:06:20

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1 (Deposition Exhibit No. 21 12:06:52

2 marked for identification.) 12:07:00

3 BY MR. FEE: 12:07:00

4 Q. Ms. Malamud, I'm going to hand you 12:07:01

5 what's been marked as Exhibit 21. It appears to 12:07:02

6 be a series of emails. The top one is from 12:07:06

7 Mr. Malamud to you, dated January 4th, 2014, at 12:07:10

8 12:01 p.m. Bates labeled PR042289-01. Take your 12:07:16

9 time and look at it, but once you've read it, if 12:07:35

10 you can identify this as a series of emails 12:07:38

11 between you and Mr. Malamud. 12:07:40

12 A. (Pause.) Okay. 12:07:51

13 Q. First of all, can you recognize -- do 12:08:35

14 you recognize this as a series of emails between 12:08:38

15 you and Mr. Malamud? 12:08:40

16 A. Yes. 12:08:41

17 Q. Why don't we start at the beginning of 12:08:41

18 the email chain, which would be on the last page. 12:08:45

19 There's an email on December 31, 2013, at 12:08:47

20 3:02 p.m. from you. Can you see? It starts off 12:08:52

21 saying, "All art completed, both diagrams and 12:09:01

22 MathML, with the exception of NFPA.NEC.2011. We 12:09:03

23 have about 12 more diagrams to complete on that. 12:09:09

24 And we should have that completed by Friday." 12:09:13

25 Do you see that? 12:09:15

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1 (Recess: 2:54 p.m. to 3:02 p.m.) 15:03:07

2 THE VIDEOGRAPHER: We're going back 15:03:07

3 on the record. The time is 3:02 p.m. 15:03:13

4 (Deposition Exhibit No. 27 15:03:22

5 marked for identification.) 15:03:22

6 (Mr. Childs not present.) 15:03:43

7 BY MR. FEE: 15:03:43

8 Q. I'm going to hand you Exhibit 27, 15:03:43

9 which is a single-page email from Carl to you, 15:03:45

10 dated January 16th, 2014, at 3:48 p.m., and Bates 15:03:53

11 labeled PRO42317. Can you identify Exhibit 27 as 15:03:59

12 an email from Mr. Malamud to you? 15:04:17

13 A. Yes. 15:04:19

14 Q. And the subject is funding. Correct? 15:04:22

15 A. Yes. 15:04:26

16 Q. And it says, you're funded at the 15:04:27

17 5K-per-month level for at least six months from 15:04:31

18 p.r.o., as long as you can keep pumping out 15:04:35

19 visible progress on the SVG/MathML front." 15:04:38

20 A. Yes. 15:04:46

21 Q. And in parentheses, it says, "Plus, of 15:04:46

22 course, your design health, which I need, but what 15:04:49

23 the funders are going to be looking for is walking 15:04:53

24 through the standards. They're funding my legal 15:04:56

25 fight so that's the piece they care about." Do 15:04:59

187  
1 you see that? 15:05:04  
2 A. Yes. 15:05:04  
3 (Mr. Childs present.) 15:05:04  
4 BY MR. FEE: 15:05:04  
5 Q. Do you know what funders he's 15:05:04  
6 referring to? 15:05:13  
7 A. I don't know exactly who they are. 15:05:13  
8 Q. Do you have any idea what funders he's 15:05:15  
9 referring to? 15:05:19  
10 A. No. 15:05:19  
11 Q. Did you ever ask, "Who are these 15:05:21  
12 funders?" 15:05:25  
13 A. I -- I wait for him to supply the 15:05:26  
14 information when he wants to. 15:05:35  
15 Q. So you never asked him for 15:05:41  
16 information? 15:05:43  
17 MR. STOLTZ: Object to the form. It 15:05:47  
18 mischaracterizes her testimony. 15:05:50  
19 A. There is funders. 15:05:59  
20 BY MR. FEE: 15:06:02  
21 Q. You never asked him who they were? 15:06:02  
22 A. No. 15:06:04  
23 MR. STOLTZ: Objection. Asked and 15:06:06  
24 answered. 15:06:07  
25 BY MR. FEE: 15:06:08

# EXHIBIT 6

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR )  
TESTING AND MATERIALS, )  
d/b/a ASTM INTERNATIONAL; ) Civil Action No.  
NATIONAL FIRE PROTECTION ) 1:13-cv-01215-TSC  
ASSOCIATION, INC.; and )  
AMERICAN SOCIETY OF )  
HEATING, REFRIGERATION AND )  
AIR CONDITIONING ENGINEERS, )  
Plaintiffs and )  
Counter-Defendants, )  
vs. )  
PUBLIC.RESOURCE.ORG, INC., )  
Defendant and )  
Counter-Plaintiff.

VIDEOTAPED 30(b)(6) DEPOSITION OF NATIONAL  
FIRE PROTECTION ASSOCIATION, INC., BY  
CHRISTIAN DUBAY, before Jeanette N. Maracas,  
Registered Professional Reporter and Notary  
Public in and for the Commonwealth of  
Massachusetts, at 42 Chauncy Street, Boston,  
Massachusetts, on Wednesday, April 1, 2015,  
commencing at 10:00 a.m.

PAGES 1 - 250

Page 1

1 A. Primarily around the media interviews. 10:26:12  
2 Q. Any other ways? 10:26:15  
3 A. The primary, from a public communications 10:26:21  
4 resource outreach aspect, is through media 10:26:32  
5 inquiries, media interviews and media 10:26:37  
6 responses when I'm requested. 10:26:40  
7 Q. How many media interviews have you given 10:26:41  
8 in the past year? 10:26:48  
9 A. I don't know. Approximately ten. 10:26:49  
10 Q. On what subjects? 10:27:02  
11 A. I don't recall. 10:27:06  
12 Q. You don't recall any of the subjects? 10:27:09  
13 A. Not off the top of my head, no, I do not. 10:27:19  
14 Q. You say that NFPA brings together a multitude 10:27:22  
15 of interested parties who participate in a 10:28:09  
16 consensus process to determine the best level 10:28:15  
17 of minimum safety; is that right? 10:28:18  
18 MR. REHN: Object to the form. 10:28:20  
19 A. NFPA has an open consensus standards 10:28:24  
20 development process that brings together many 10:28:27  
21 differing viewing points of interest, 10:28:32  
22 interest categories as well as the public in 10:28:35  
23 order to develop our codes and standards. 10:28:39  
24 Q. How does NFPA bring them together? 10:28:43  
25 MR. REHN: Objection as to form. 10:28:51

1 A. One way is through our technical committee 10:28:53  
2 meetings. 10:28:55  
3 Q. How else does NFPA bring them together? 10:29:01  
4 A. Through our annual meeting. 10:29:07  
5 Q. How else? 10:29:10  
6 A. Through special, specially called topical 10:29:17  
7 meetings. 10:29:23  
8 Q. How else? 10:29:28  
9 A. Through technical forums and summits. 10:29:29  
10 Q. How else? 10:29:40  
11 A. That's all I can think of off the top of my 10:29:41  
12 head. 10:29:57  
13 Q. And what does NFPA do to bring them together? 10:29:57  
14 MR. REHN: Object to the form. 10:30:05  
15 Vague. 10:30:07  
16 A. With respect to our technical committee 10:30:10  
17 meetings, we, through the committee, call the 10:30:12  
18 meeting and book the meeting facility and 10:30:16  
19 host the meeting. 10:30:20  
20 Q. Anything else? 10:30:30  
21 MR. REHN: Same objection. 10:30:32  
22 A. To clarify, with respect to committee 10:30:35  
23 meetings? 10:30:37  
24 Q. Yes. 10:30:38  
25 A. We publicly promote them, as all of our 10:30:39

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1 handle all the logistics around that meeting 10:32:09  
2 space and any required hotels. 10:32:12  
3 Q. How does NFPA host the meeting? 10:32:14  
4 MR. REHN: Object to the form. 10:32:20  
5 Q. I should say how does NFPA host the meetings? 10:32:24  
6 MR. REHN: Same objection. 10:32:28  
7 A. I think the best approach is that because 10:32:29  
8 it's an NFPA meeting, so it's -- we're 10:32:31  
9 calling -- when I say we're calling the 10:32:36  
10 meeting, so it's our committee meeting as an 10:32:37  
11 example. 10:32:41  
12 So NFPA staff is there, technical 10:32:41  
13 staff is there facilitating and running the 10:32:46  
14 meeting along with the actual volunteer 10:32:48  
15 technical committee chair. So I think that 10:32:50  
16 should clarify what I'm implying by 10:32:54  
17 "hosting." 10:32:56  
18 Q. How does the NFPA staff facilitate and run 10:32:57  
19 the meetings along with the technical 10:33:15  
20 committee chairs? 10:33:17  
21 A. Again, just to clarify, just focusing on 10:33:20  
22 technical committee meetings? 10:33:23  
23 Q. Yes. 10:33:24  
24 A. Okay. We have a technical staff liaison 10:33:25  
25 who's assigned to each of our standards and a 10:33:30

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1 portion of their job is to attend the 10:33:33  
2 technical committee meetings. 10:33:36  
3 Q. What do the liaisons do at those meetings 10:33:39  
4 when they attend them? 10:33:45  
5 MR. REHN: Object to the form. 10:33:45  
6 A. Their primary responsibility is to capture 10:33:46  
7 all of the technical changes that the 10:33:51  
8 committee is making to the document they're 10:33:54  
9 working on or standard they're working on. 10:33:57  
10 Q. What do you mean by technical changes in that 10:34:02  
11 context? 10:34:24  
12 A. Our technical committees are responsible for 10:34:27  
13 developing changes to our codes and 10:34:31  
14 standards. And one of the primary 10:34:34  
15 responsibilities of the technical staff 10:34:37  
16 liaison is to capture those changes. 10:34:39  
17 Q. In what respect are those changes technical 10:34:46  
18 changes? 10:34:50  
19 A. Those changes are specific, technical being 10:34:53  
20 scientific or wording changes to our codes 10:34:57  
21 and standards which are technical documents. 10:35:01  
22 Q. How do you distinguish between scientific 10:35:08  
23 changes and wording changes to the technical 10:35:11  
24 documents? 10:35:17  
25 MR. REHN: Object to the form. 10:35:18

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1 committee is trying to accomplish to ensure 10:38:27  
2 that when those changes go out for ballot to 10:38:29  
3 our technical committees, it's accurate. 10:38:32  
4 Q. That it accurately reflects what the 10:38:35  
5 technical committee intended to produce? 10:38:38  
6 A. The primary job -- 10:38:41  
7 MR. REHN: Object to the form. 10:38:43  
8 A. The primary job of the technical staff 10:38:44  
9 liaison is to ensure that any recorded 10:38:46  
10 actions accurately reflect that intent of the 10:38:48  
11 technical committee. 10:38:51  
12 MR. REHN: If I can just remind the 10:38:52  
13 witness to give me a chance to object after 10:38:53  
14 the question is asked. Helps the court 10:38:56  
15 reporter out if we're not talking over each 10:39:03  
16 other. 10:39:06  
17 A. Sorry. 10:39:07  
18 Q. You mentioned some sort of the editorial 10:39:16  
19 activity in support of the technical 10:39:30  
20 committees; is that correct? 10:39:35  
21 MR. REHN: Object to form. 10:39:35  
22 Q. You used the word "editorial." I didn't 10:39:36  
23 quite understand the context. 10:39:39  
24 A. There's an extensive amount of support that 10:39:41  
25 NFPA staff provides to our standards 10:39:43

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1 development process. A piece of that is, for 10:39:45  
2 example, compliance with our manual of style. 10:39:50  
3 Q. What form does that support take? 10:39:57  
4 MR. REHN: Object to the form. 10:40:03  
5 A. It takes several forms. First and foremost 10:40:07  
6 is to capture the specific text or record the 10:40:10  
7 specific technical changes that occurred at 10:40:14  
8 the meeting. 10:40:17  
9 Q. Anything else? 10:40:17  
10 A. Second is to ensure that the wording is in 10:40:26  
11 compliance with our manual style. 10:40:32  
12 Q. Anything else? 10:40:39  
13 A. Also the technical staff is there to ensure 10:40:40  
14 that the new or modified requirements align 10:40:47  
15 with the remainder of the document. 10:40:51  
16 Q. Anything else? 10:40:58  
17 A. They also spend time reviewing those 10:41:05  
18 requirements, the technical staff does, to 10:41:10  
19 make sure they don't establish conflicting 10:41:12  
20 requirements with other portions of that 10:41:14  
21 document or other NFPA standards. 10:41:18  
22 Q. Anything else? 10:41:21  
23 A. Another responsibility is to come back to 10:41:25  
24 NFPA to their offices and ensure that our 10:41:32  
25 editorial production team has full knowledge 10:41:34

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1 of those changes as they modify the -- 10:41:39  
2 develop the next edition of the standard. 10:41:43  
3 Q. Anything else? 10:41:48  
4 A. There's an extensive amount of back and forth 10:42:08  
5 between the editorial and production staff 10:42:11  
6 and the technical staff to finalize the 10:42:14  
7 language prior to balloting. 10:42:18  
8 Q. Anything else? 10:42:27  
9 A. Once the language is finalized, the technical 10:42:31  
10 staff works with our project administrators 10:42:37  
11 to develop a technical committee ballot which 10:42:41  
12 is then circulated to that technical 10:42:44  
13 committee. 10:42:44  
14 Q. Anything else? 10:42:51  
15 A. Once the ballot is completed and approved, 10:43:16  
16 the technical staff, working with the project 10:43:22  
17 administrators, then circulates the ballot of 10:43:23  
18 the proposed changes to that full technical 10:43:27  
19 committee. 10:43:30  
20 Q. Do they circulate the proposed ballot or 10:43:39  
21 the actual ballot to the full technical 10:43:39  
22 committee? 10:43:39  
23 A. The actual ballot. The actual ballot is 10:44:03  
24 submitted to the committee for formal voting. 10:44:07  
25 Q. Anything else? 10:44:15

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1 Q. Is there anything about the development of 11:16:19  
2 standards that the regulations do not cover? 11:16:21  
3 A. Our regulations cover the specific accredited 11:16:27  
4 rules and hence, its regulations. We also 11:16:33  
5 have our committee officers guide which 11:16:35  
6 provides guidance to our technical committee 11:16:37  
7 members as well as our chairs and our manual 11:16:41  
8 style. 11:16:46  
9 Q. What other documents govern or regulate the 11:16:46  
10 development of standards within NFPA? 11:17:44  
11 A. Off the top of my head I can't think of 11:17:56  
12 anything else. 11:17:59  
13 Q. Who participates in -- strike that. 11:18:09  
14 Who are the members, generally 11:18:17  
15 speaking, the category of NFPA's technical 11:18:20  
16 committees? 11:18:26  
17 A. Just for clarification, the representation or 11:18:29  
18 are they members of NFPA? We have 11:18:36  
19 categories -- we have interest categories of 11:18:39  
20 our committee members. 11:18:43  
21 Q. Who -- what persons are entitled to be 11:18:43  
22 members of NFPA's technical committees? 11:18:48  
23 MR. REHN: Objection as to form. 11:18:51  
24 A. Anyone can apply to be a member of an NFPA 11:18:55  
25 technical committee, and based upon their 11:18:59

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1 expertise and their background, they're 11:19:01  
2 evaluated through a process that ultimately 11:19:04  
3 involves standards council appointing them 11:19:07  
4 to, or not appointing, depending on their 11:19:10  
5 credentials, to the various technical 11:19:12  
6 committees. 11:19:14  
7 Q. So the standards council determines who gains 11:19:17  
8 admission to membership in the technical 11:19:21  
9 committees? 11:19:23  
10 A. That's correct. 11:19:24  
11 Q. What criteria does the standards council 11:19:27  
12 apply in determining who should gain 11:19:35  
13 membership to the technical committees? 11:19:39  
14 MR. REHN: Objection as to form. 11:19:42  
15 A. It's a multipart criteria. First is 11:19:46  
16 technical expertise within that subject 11:19:51  
17 matter. Second is balance; is the committee 11:19:54  
18 an appropriate balance. And third is the 11:20:01  
19 ability to participate. 11:20:02  
20 Q. What do you mean by balance? 11:20:06  
21 A. By our regulations, NFPA technical committees 11:20:12  
22 are required to have a balance of interest 11:20:16  
23 categories to ensure that no one party or one 11:20:18  
24 interest category can dominate the process. 11:20:21  
25 Q. What are the interest categories? 11:20:24

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1 A. There are, I believe, nine interest 11:20:27  
2 categories, including -- one example is 11:20:31  
3 research and testing is an example. Another 11:20:37  
4 example is enforcer, which includes 11:20:40  
5 government officials, both, sometimes federal 11:20:44  
6 but state and local jurisdictions, as well as 11:20:48  
7 special expert, which is consultants as an 11:20:52  
8 example. 11:20:56

9 Users, installer maintainers which 11:20:56  
10 are those who install the systems, consumers, 11:21:02  
11 and that's all I can think of. I'm not sure 11:21:13  
12 if I said it, but consumer is another one 11:21:30  
13 that can represent a special -- have a 11:21:34  
14 specific slot. Oh, I'm sorry, one other slot 11:21:35  
15 is labor, is another slot. 11:21:38

16 Q. Thank you. Are all NFPA employees members of 11:21:51  
17 the technical committees? 11:22:16

18 MR. REHN: Objection as to form. 11:22:20

19 A. NFPA employees are not -- cannot be members 11:22:23  
20 of our technical committees. However, as I 11:22:27  
21 stated previously, it's important -- there's 11:22:30  
22 an important role that NFPA staff plays in 11:22:32  
23 guiding, advising the committee, coordinating 11:22:35  
24 the activities and providing their technical 11:22:37  
25 expertise, especially technical staff liaison 11:22:40

1                   How are persons chosen to serve on                   11:24:06  
2                   the standards council?                   11:24:08  
3                   MR. REHN: Object to the form.                   11:24:12  
4           A. Because the standards council is the                   11:24:15  
5           overarching body over our entire standards                   11:24:18  
6           development process, they are appointed                   11:24:21  
7           through a process that involves the NFPA                   11:24:24  
8           president making recommendations to the NFPA                   11:24:27  
9           board of directors. Ultimately the standards                   11:24:29  
10          council members are appointed by our board of                   11:24:33  
11          directors.                   11:24:35  
12          Q. Are any NFPA employees members of the                   11:24:40  
13          standards council?                   11:24:43  
14                  MR. REHN: Objection as to form.                   11:24:45  
15          A. Specifically, no. However, similar to the                   11:24:49  
16          technical committees, there is staff assigned                   11:24:51  
17          to support the standards council, their                   11:24:55  
18          activities and their decisions.                   11:24:58  
19          Q. I'd like to go back for a moment to the                   11:25:11  
20          process after the technical committee has                   11:25:19  
21          decided on changes to a standard.                   11:25:26  
22                  And you say that a staff                   11:25:31  
23          representative, NFPA staff representative                   11:25:38  
24          will capture those changes from the technical                   11:25:41  
25          committee, correct?                   11:25:44

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1 MR. REHN: Object to the form. 11:25:48

2 A. The NFPA technical staff that serves as, the 11:25:50  
3 term we use is a staff liaison to a technical 11:25:54  
4 committee, they do more than just capture the 11:25:56  
5 specific wordings. 11:26:00

6 What they do is they are each 11:26:01  
7 technical experts in their field and they not 11:26:03  
8 only capture or record those changes, but 11:26:06  
9 they provide their expertise to the 11:26:09  
10 committee, their field experience, what they 11:26:11  
11 have, the information that they're bringing 11:26:14  
12 in through questions on the standards and 11:26:16  
13 such. 11:26:18

14 And they provide that technical 11:26:19  
15 expertise to the committee so the committee 11:26:21  
16 can utilize that, a complete combination with 11:26:24  
17 all the public input or comments, to land on 11:26:27  
18 a final set of proposed language. In 11:26:32  
19 summary, it's more than just recording. 11:26:37  
20 They're not really recording secretaries, per 11:26:39  
21 se. 11:26:43

22 Q. But who ultimately determines the language of 11:26:43  
23 the technical committee's proposed changes to 11:26:47  
24 a code or standard? 11:26:51

25 MR. REHN: Objection as to form. 11:26:53

|    |   |          |
|----|---|----------|
| 1  | It's ambiguous.                               | 11:26:54 |
| 2  | A. The final decision is accomplished through | 11:26:56 |
| 3  | that ballot of the technical committee, but   | 11:26:58 |
| 4  | the wording itself is that combination of the | 11:27:01 |
| 5  | technical staff and the committee working to  | 11:27:05 |
| 6  | capture the requirement and get it worded     | 11:27:07 |
| 7  | properly in the right context, in the right   | 11:27:09 |
| 8  | order within a document so that when the      | 11:27:12 |
| 9  | final specific words are balloted, the        | 11:27:14 |
| 10 | committee has it in context of the whole      | 11:27:18 |
| 11 | standards and they can make that decision,    | 11:27:20 |
| 12 | seeing it within the body of the standard.    | 11:27:22 |
| 13 | Q. When the text is balloted, is there any    | 11:27:24 |
| 14 | indication to the members of the committee    | 11:27:27 |
| 15 | what variations have occurred as a            | 11:27:32 |
| 16 | consequence of staff input from the text that | 11:27:38 |
| 17 | the committee itself was proposing?           | 11:27:43 |
| 18 | MR. REHN: Objection as to form.               | 11:27:47 |
| 19 | Vague. Lacks foundation. Assumes facts not    | 11:27:48 |
| 20 | in evidence.                                  | 11:27:51 |
| 21 | A. There are really two types of changes the  | 11:27:53 |
| 22 | committee is balloted on. One is the -- a     | 11:27:57 |
| 23 | plain first revision or second revision,      | 11:28:01 |
| 24 | which may have been edited to comply with our | 11:28:04 |
| 25 | manual style, get the wording right. That is  | 11:28:07 |

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1 system, so there would not be a first or 11:31:14  
2 second draft report. There would be a report 11:31:17  
3 on proposals and a report on comments. 11:31:23  
4 Q. Does either of those reports show what 11:31:26  
5 changes in text may have been contributed by 11:31:30  
6 technical staff, technical committee 11:31:33  
7 liaisons? 11:31:38  
8 A. All of the changes in our old system were 11:31:41  
9 contained within the proposals and action on 11:31:45  
10 proposals and comment and actions on 11:31:48  
11 comments, so, in some cases, they may have 11:31:50  
12 been called out on the report and in some 11:31:53  
13 cases not. 11:31:56  
14 Ultimately, all of them had been 11:31:57  
15 balloted through the technical committees. 11:31:58  
16 Whatever you see in the report on proposals 11:32:01  
17 are comments that had gone through the 11:32:03  
18 committee process. 11:32:05  
19 Q. I'm trying to understand how one can 11:32:05  
20 ascertain what, if any, text in any code or 11:32:08  
21 standard has been contributed by NFPA 11:32:17  
22 technical staff. 11:32:21  
23 MR. REHN: Objection as to form, and 11:32:26  
24 the compound nature of the question. 11:32:29  
25 Q. Please tell me how one can ascertain that. 11:32:31

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1 MR. REHN: Same objection. 11:32:34

2 A. What I can say about when you look at the 11:32:36

3 wording of a standard, what's been added or 11:32:39

4 worked on by technical staff is, any changes, 11:32:42

5 any text that has been modified in the 11:32:45

6 document has been worked on by technical 11:32:47

7 staff, has been modified, been adjusted to 11:32:49

8 fit the form of our manual style as well as 11:32:54

9 to be consistently worded with the technical 11:32:57

10 body of the standard. 11:32:59

11 So each and every change has been 11:33:01

12 clarified or worked on by technical staff to 11:33:06

13 get it ready for committee ballot. So 11:33:09

14 there's an extensive amount of time. The NEC 11:33:11

15 is an excellent example of the NFPA staff get 11:33:15

16 it worded correctly and in proper format, 11:33:18

17 style and technical comments to be balloted 11:33:23

18 by the technical committee. 11:33:28

19 Q. Where can one detect what changes -- you used 11:33:28

20 the word "worked on," for example. That's a 11:33:33

21 little vague in this context. I would like 11:33:36

22 to know how one can identify any text 11:33:38

23 contributed by technical committee staff 11:33:42

24 liaison in any NFPA code or standard. 11:33:48

25 MR. REHN: Objection as to form. 11:33:54

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1 It's ambiguous. It's compound. 11:33:55

2 A. Because -- how can I explain. Because 11:34:03

3 ultimately the final text, the changes are 11:34:06

4 balloted by the technical committee, 11:34:10

5 oftentimes the staff's work on that text is 11:34:12

6 contained within the same wording that's 11:34:15

7 being balloted, the ultimate wording that's 11:34:17

8 balloted by the committee. 11:34:20

9 So in our old system, that was 11:34:21

10 all -- when you see a change in the document, 11:34:22

11 you can know, and that's why I had my 11:34:24

12 previous answer, that staff was involved in 11:34:26

13 that process. 11:34:28

14 In the new process that happens with 11:34:30

15 every revision, every revision staff is 11:34:31

16 involved in and worked on and more or less 11:34:35

17 touched, modified, cleaned up to get it ready 11:34:37

18 for balloting. 11:34:40

19 There's also an additional level in 11:34:41

20 our new process of editorial revisions so 11:34:42

21 that it's clear to the committee that this is 11:34:47

22 something that is not directly tied but it is 11:34:48

23 because of another technical change. So it's 11:34:52

24 just slightly different. 11:34:54

25 But I can say clearly, if you see a 11:34:56

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1 revision to the document or a change, for 11:34:57  
2 example, to the 2008 NEC, that text has been 11:35:00  
3 worked on by editorial production, technical 11:35:05  
4 expertise of the staff liaisons on that 11:35:07  
5 project. That's their job. 11:35:11

6 Q. But I'm not asking about what the technical 11:35:14  
7 staff have worked on because they may have 11:35:16  
8 worked on language that may have come from 11:35:20  
9 the 2005 NEC that has survived into the 2008, 11:35:22  
10 2011, 2014. I'm asking how does one identify 11:35:29  
11 any text contributed by a technical committee 11:35:34  
12 staff liaison in any code or standard of NEC? 11:35:41

13 MR. REHN: Objection as to form. 11:35:45  
14 That's ambiguous. It's compound. 11:35:48

15 A. Again, to further try to clarify this is if 11:35:52  
16 the text was in a previous edition of the 11:35:57  
17 document and moved forward, it would not 11:36:00  
18 show an indication of being modified. But 11:36:03  
19 wherever there is new text added, deleted 11:36:06  
20 or modified, there's an indication in the 11:36:09  
21 margin or shading, in the case of NEC, that 11:36:11  
22 shows that text has been modified, worked 11:36:15  
23 on, whatever. 11:36:18

24 And those words can come from lots 11:36:18  
25 of places. And the technical staff is 11:36:20

1 go -- strike that. 11:40:50

2 If you needed to identify the 11:40:53

3 language that NFPA employees contributed to 11:40:55

4 NFPA codes and standards, how would you 11:41:05

5 determine that language? 11:41:07

6 MR. REHN: Objection as to form. 11:41:10

7 It's vague and compound. 11:41:11

8 A. What we could determine is the language the 11:41:15

9 technical committee at the end of the day 11:41:19

10 approved. Into -- each individual word and 11:41:21

11 such would be difficult, if not impossible, 11:41:25

12 because of ultimately the technical staff 11:41:30

13 provides that content to the committee which 11:41:33

14 then approves those words. 11:41:35

15 Q. You said the technical staff provides the 11:41:37

16 content to the committee? The technical 11:41:44

17 staff doesn't draft the standards, correct? 11:41:47

18 MR. REHN: Objection as to form. 11:41:51

19 Mischaracterizes. 11:41:53

20 A. In many cases the technical staff in the room 11:41:59

21 is drafting the text. 11:42:02

22 Q. Is proposing new text? 11:42:04

23 A. In some cases yes, to accomplish what the 11:42:10

24 committee is trying to accomplish. The 11:42:13

25 technical staff of NFPA are experts in their 11:42:15

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1 field, and the committee may want to 11:42:20  
2 establish a requirement for X and the 11:42:23  
3 technical staff is there saying, well, we can 11:42:24  
4 word it this way and that way, does this meet 11:42:27  
5 your intent, how about we do this, I can 11:42:29  
6 research some information, get back to you at 11:42:30  
7 the next meeting. 11:42:32

8 The technical staff provides a vital 11:42:33  
9 role in helping the technical committee 11:42:35  
10 accomplish their mission of developing those 11:42:38  
11 words that become ultimately the final words 11:42:40  
12 of the standard. 11:42:43

13 Q. Who makes the decision about the words in a 11:42:44  
14 standard? 11:42:46

15 MR. REHN: Objection as to form. 11:42:46  
16 Ambiguous. 11:42:48

17 A. The final decision is -- and to summarize, 11:42:49  
18 it's a two-part decision. A committee 11:42:54  
19 ballots on it, the ballot's on the final 11:42:55  
20 word, the committee approves it. At the 11:42:58  
21 end of the day our standards council issues 11:43:00  
22 that document, but the committee ballot 11:43:03  
23 establishes the position of the type of 11:43:03  
24 committee at that time. 11:43:07

25 Q. And how does the text evolve up to the point 11:43:07

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1           that the text of the technical committee is           11:43:16  
2           balloted?           11:43:19  
3                   MR. REHN: Objection as to form.           11:43:20  
4           Ambiguous. Compound.           11:43:22  
5       A. The text can evolve and by evolve, you mean           11:43:25  
6           created and included? Is that what you're           11:43:28  
7           saying?           11:43:31  
8       Q. I think so.           11:43:32  
9       A. So in a few ways. One is it can be submitted           11:43:33  
10           through a proposal form or public input form           11:43:37  
11           or a public comment form. The language can           11:43:45  
12           come from that. It can come from the           11:43:49  
13           expertise of the technical committee members           11:43:53  
14           who are sitting on the committee, or it can           11:43:55  
15           come from technical staff providing that to           11:43:58  
16           the committee as their work progresses along.           11:44:01  
17                   Ultimately that evolution is the           11:44:06  
18           staff liaison synthesizes all that with the           11:44:08  
19           direction of the committee to land on the           11:44:13  
20           final technical language that is balloted.           11:44:15  
21       Q. With the direction of the committee, meaning           11:44:18  
22           with the approval of the committee members?           11:44:29  
23                   MR. REHN: Objection as to form.           11:44:31  
24           Mischaracterizes the testimony.           11:44:34  
25       Q. What do you mean by with the direction of the           11:44:36

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1 committee? 11:44:38

2 A. So a committee could want to establish a 11:44:40

3 requirement again for X for something and 11:44:45

4 they may say, we want the requirement to read 11:44:48

5 12 and the staff liaison would have to put 11:44:51

6 text around that to get it to read in context 11:44:55

7 of the document. Or they may say we want to 11:44:57

8 have a draft chapter on something, technical 11:45:00

9 staff can you do research, pull together 11:45:03

10 drafting of documents to present to the 11:45:12

11 committee to consider. 11:45:14

12 In the end the committee will agree 11:45:16

13 through a meeting vote what text is going to 11:45:19

14 move forward towards ballot. Then the 11:45:21

15 staff's job is to turn that into a ballot and 11:45:24

16 make sure it fits to our manual style and 11:45:28

17 ballot with the technical committee on the 11:45:28

18 final language. 11:45:31

19 Q. What criteria do technical committees use 11:45:31

20 to determine what text moves forward to a 11:45:34

21 ballot? 11:45:37

22 MR. REHN: Objection as to form. 11:45:38

23 A. It's their expertise. It's their 11:45:42

24 professional opinion in a balanced way 11:45:46

25 through a meeting vote of what they believe 11:45:48

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1 A. No. There's no place on our form to indicate 12:48:27  
2 what category you are applying to. That's 12:48:46  
3 ultimately the decision of our standards 12:48:50  
4 council. 12:48:52

5 Q. Do you see on the third page of Exhibit 1231, 12:48:52  
6 the page ending 38520, there's no assigned -- 12:48:59  
7 copyright assignment language on this, 12:49:10  
8 correct? 12:49:14

9 MR. REHN: Object to the form. 12:49:15  
10 Mischaracterizes the document. Calls for a 12:49:17  
11 legal opinion. 12:49:19

12 A. Each and every committee member participates 12:49:23  
13 in the NFPA process with the full 12:49:26  
14 understanding that the material that they're 12:49:28  
15 developing is the intellectual property of 12:49:30  
16 NFPA. And that has been that way for as long 12:49:33  
17 as I've been involved in NFPA and as part of 12:49:36  
18 the application process as well as we have a 12:49:38  
19 policy that we verify each and every public 12:49:42  
20 input public comment proposal that comes in 12:49:44  
21 that that has happened. 12:49:47

22 Q. Do you understand what a work-made-for-hire 12:49:51  
23 is? 12:49:55

24 MR. REHN: Object to the form. 12:49:55  
25 Calls for a legal opinion. 12:49:56

1 Q. That's a yes, then? 03:00:28

2 A. Yes, it does look typical. 03:00:29

3 Q. It appears that this document lacks a 03:00:39

4 signature. I gather that NFPA would accept 03:00:42

5 proposals like this that lacked signatures; 03:00:46

6 is that correct? 03:00:50

7 MR. REHN: Object to the form. 03:00:50

8 A. We have a policy in place to not accept any 03:00:52

9 proposals, comments, public inputs or public 03:00:54

10 comments in our new process without the 03:00:57

11 appropriate copyright transfer. In my 03:00:59

12 personal opinion, I note that it's an -- it 03:01:02

13 appears to be a Word file and many times we 03:01:04

14 would get individuals would submit large 03:01:07

15 numbers of proposals and comments with a 03:01:10

16 cover sheet having a signature applying to 03:01:13

17 all of them. 03:01:15

18 And this may be that case, but I'm 03:01:18

19 speculating on that point. But we have a 03:01:20

20 strict policy in place to review each policy 03:01:22

21 for signature. 03:01:26

22 Q. Because it's important to NFPA to get a 03:01:26

23 signature to Point 5 on this document; is 03:01:29

24 that correct? 03:01:34

25 MR. REHN: Object to the form. 03:01:34

1 A. We have a policy in place, and the importance 03:01:39  
2 of that policy is to verify each and every 03:01:42  
3 public input, public comment and under the 03:01:45  
4 old system, proposal that a signature was 03:01:48  
5 provided on any and all submissions. 03:01:51  
6 Q. My question was whether it was important to 03:01:54  
7 get that for Paragraph 5? 03:01:56  
8 MR. REHN: Object to the form. 03:02:00  
9 Asked and answered. 03:02:03  
10 A. Historically, for my team, it was important 03:02:05  
11 because we had a policy in place to the point 03:02:11  
12 that we had full-time staff assigned to that 03:02:13  
13 one task. And during times of heavy volumes, 03:02:15  
14 we would assign multiple staff to that 03:02:18  
15 specific task. 03:02:21  
16 (Exhibit 1247 marked for 03:03:06  
17 identification.) 03:03:41  
18 Q. I've handed you Exhibit 1247. Do you 03:03:41  
19 recognize this as a document that NFPA 03:03:53  
20 maintains in the ordinary course of business 03:03:55  
21 as part of the standard development process? 03:04:00  
22 A. Yes, this form does look typical, 03:04:08  
23 Exhibit 1247. 03:04:11  
24 Q. This was a non-electrical form, but the 03:04:11  
25 sender indicated it was for the National 03:04:14

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1 off the record. 05:38:17

2 VIDEOGRAPHER: The time is 5:38. 05:38:17

3 This is the end of Tape No. 3, and we are now 05:38:19

4 off the record. 05:38:22

5 (Break taken) 05:38:25

6 VIDEOGRAPHER: The time is 5:53. 05:53:03

7 This is the beginning of Tape No. 4, and we 05:53:15

8 are now back on the record. 05:53:17

9 BY MR. BRIDGES: 05:53:20

10 Q. Mr. Dubay, you mentioned earlier that NFPA's 05:53:20

11 staff check each of these proposal and 05:53:26

12 comment forms when they are submitted to look 05:53:34

13 for signatures on the copyright language and 05:53:42

14 indications as to whether the material is 05:53:46

15 original or comes from another source; is 05:53:48

16 that correct? 05:53:52

17 A. We have a policy that each and every 05:53:53

18 proposal, public input or comment is reviewed 05:53:57

19 for completeness being signature, copyright 05:53:59

20 release as well as any attached materials for 05:54:03

21 potential copyright with those as well. 05:54:08

22 Q. How many proposals, communications with 05:54:11

23 public input or comments, falling in the 05:54:20

24 categories you just mentioned, does NFPA 05:54:26

25 receive each year? 05:54:29

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# EXHIBIT 7

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA

-----  
AMERICAN SOCIETY FOR TESTING AND ) Case No.  
MATERIALS d/b/a ASTM INTERNATIONAL; ) 1:13-cv-01215-EGS  
NATIONAL FIRE PROTECTION )  
ASSOCIATION, INC.; and )  
AMERICAN SOCIETY OF HEATING, )  
REFRIGERATING, AND )  
AIR-CONDITIONING ENGINEERS, INC., )  
Plaintiffs, )  
vs. )  
PUBLIC.RESOURCE.ORG, INC., )  
Defendant. )  
-----  
AND RELATED COUNTERCLAIMS. )  
-----

RULE 30(B)(6) VIDEOTAPED DEPOSITION OF AMERICAN  
SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING  
ENGINEERS, INC.

BY AND THROUGH ITS DESIGNEE,

STEPHANIE REINICHE

MONDAY, MARCH 30, 2015

9:10 a.m.

VERITEXT LEGAL SOLUTIONS  
1075 PEACHTREE STREET  
SUITE 3625  
ATLANTA, GEORGIA

Reported By:  
SHARON A. GABRIELLI, CCR B-2002  
Job No. 2035289

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1 knowledge, it's the -- the requirement is all 09:45  
2 states are supposed to become compliant with 09:48  
3 it or deem to comply by another method every 09:43  
4 so many years to the latest version of 09:49  
5 90.1. 09:41

6 Q (BY MR. BECKER) When you say that all states 09:45  
7 must become compliant, does that mean that the states 09:47  
8 have to adopt this into their regulations or does it 09:40  
9 mean that these states have to build their buildings to 09:45  
10 comply with the EPAct? 09:49

11 MR. CUNNINGHAM: Object to form. 09:41

12 THE WITNESS: It means they're supposed 09:43  
13 to adopt a code that is equivalent to the 09:45  
14 current version of 90.1 within two -- I 09:48  
15 believe it's within two years of each year, 09:41  
16 or there is some other rules that they have 09:45  
17 to follow if they don't deem to comply. 09:48

18 It does not have to be 90.1. It could 09:42  
19 be another version of a different code. 09:44  
20 So... 09:47

21 Q (BY MR. BECKER) What other codes would -- 09:45  
22 would suffice to -- to satisfy the EPAct? 09:40

23 MR. CUNNINGHAM: Object to form. 09:44

24 THE WITNESS: The IECC. 09:47

25 Q (BY MR. BECKER) What is the IECC? 09:40

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1           A     International Energy -- I'm not positive. I 09:44  
2     just speak in acronyms, so I can't remember. I have to 09:49  
3     look it up, to be honest. But it's through 09:42  
4     International Code Council. It's their energy 09:47  
5     efficiency code. 09:42

6           Q     The International Code Council, are they 09:46  
7     known as ICC? 09:48

8           A     Yes. 09:40

9           Q     What's the -- is there any relationship of 09:44  
10    the IECC to ASHRAE's Standard 90.1? 09:47

11          A     90.1 is a compliance option to the IECC. 09:43

12          Q     What does that mean? 09:42

13          A     It means you can choose -- if you adopt that 09:44  
14    as your code and you adopt it in its entirety and 09:49  
15    then -- and 90.1 is a reference as a compliance option 09:43  
16    at the -- whatever level you're -- design your code -- 09:49  
17    wherever that code is adopted, if they -- if the 09:43  
18    builder wants to build according to what's in 90.1, 09:46  
19    they have that option or they can build according to 09:49  
20    the IECC, and then that's their choice. 09:42

21          Q     Does the IECC say within it that someone can 09:41  
22    comply with ASHRAE Standard 90.1 and that would be 09:47  
23    sufficient? 09:40

24               MR. CUNNINGHAM: Object to form. 09:41

25               THE WITNESS: It -- there is a reference 09:43

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1 that are assigned to other managers in the department? 09:47

2 A We just -- we just split them up because 09:41

3 of staff loads. One person can't support them based on 09:44

4 their meeting schedules; one person can't do all of 09:40

5 them. Some of them, it's based on their prior 09:43

6 expertise. 09:47

7 Q And do you know what standards they are that 09:49

8 are not assigned to Mark Weber that are American 09:41

9 standards? 09:45

10 A Yes. 09:45

11 Q And which standards are those? 09:46

12 A 90.1, 90.2, 90.4, 189.1, 15, 34. 09:49

13 Q And who is Standard 90.1 assigned to? 09:53

14 A Steve Ferguson. 09:59

15 Q And you say that Steve Ferguson reports to 09:50

16 you as well? 09:53

17 A Yes. 09:54

18 Q And what is Steve Ferguson's position? 09:55

19 A Manager of standards for codes. 09:58

20 Q And he's also the staff liaison for 90.1, you 09:56

21 were saying? 09:51

22 A Yes. 09:51

23 Q Okay. What does Mr. Ferguson do as staff 09:54

24 liaison for 90.1? 09:57

25 A A lot of things. He'll -- he does -- he'll 09:59

1 do a double review of the membership items reviewed by 09:53  
2 Katrina, works with the project committee chair to help 09:58  
3 come up with a balance committee, looking at terms, you 09:54  
4 know, helping making sure they, you know, get -- rotate 09:59  
5 people in and out per our rules. He attends all the 09:52  
6 full project committee meetings, some of the 09:59  
7 subcommittee meetings. 09:52

8 He processes the letter ballots for approval 09:55  
9 of all drafts. He reviews the drafts to make sure 09:57  
10 they're written consistently. He points out conflicts 09:52  
11 when they make one change to a section and then they 09:56  
12 haven't made a similar change to another section so 09:58  
13 there's not conflicts. 09:53

14 He reviews all of the public -- final 09:55  
15 publication drafts in the final roll-ups of the 90.1 09:58  
16 for each new version every three years. He does the 09:53  
17 minutes. 09:57

18 Q Are you aware of any other work that 09:53  
19 Mr. Ferguson does as the staff liaison for 90.1? 09:55

20 A That's -- that's pretty much the general 09:51  
21 stuff that I can think of. He has other duties besides 09:54  
22 90.1. 09:57

23 Q Does Mr. Ferguson draft any of the text for 09:58  
24 90.1? 09:53

25 A He reviews the drafts and points out 09:54

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1 conflicts. 09:57

2 Q But he doesn't contribute text directly to 09:57

3 90.1? 09:51

4 A No. He may comment when they're discussing 09:52

5 proposed text changes to make them aware of something, 09:56

6 but he does not necessarily, unless they wrote 09:50

7 something in the incorrect format. 09:53

8 Q And what would he do if they had written 09:56

9 something in an incorrect format? 09:58

10 A He would edit it, send it back. If it's a 09:50

11 substantive change to fix it, then it would have to go 09:53

12 back to the committee for a new vote. If it's 09:56

13 editorial, then the chair or a subcommittee -- or in 09:59

14 consultation with a subcommittee chair can say that's 09:54

15 correct and -- and then move it forward in whatever 09:58

16 step in the process it's in. 09:50

17 Q When you say he edits it and sends it back, 09:51

18 does that mean that he actually changes the text, or 09:54

19 does this mean that he sends a comment that there is a 09:56

20 conflict or something like that and leaves it to the 09:50

21 committee to make the change? 09:52

22 A If it's -- it depends. If it's a conflict 09:54

23 and he understands -- he has an engineering degree, so 09:57

24 if he understands how to change it, he can propose a -- 09:51

25 he may propose the wording change. If it's not 09:55

1 something he understands and it's a conflict, then 09:50

2 he'll comment and ask the committee for direction. 09:53

3 Q And is there any record of the wording 09:53

4 changes that Mr. Ferguson has proposed? 09:56

5 A There's probably -- if he sent something 09:52

6 back, it -- to the committee, it would have been sent 09:54

7 via email. 09:58

8 Q If you wanted to go back and find any 09:51

9 proposed changes that Mr. Ferguson had made, how would 09:57

10 you go about doing that? 09:51

11 A I'd have to look in his email. He wouldn't 09:52

12 have proposed them in the minutes. That's not 09:55

13 something recorded in the minutes, so he would have 09:57

14 sent it via email. 09:59

15 Q And how would that -- would that change be 09:52

16 reflected in the minutes in -- in any way? 09:54

17 A Not -- not unless it was -- if he sent a 09:58

18 change back, this assumes that the committee has 09:54

19 already approved the proposed change. And if there was 09:57

20 an issue and he sent it back, then if -- if a change 09:59

21 had to be made that was substantive, there would be 09:54

22 another -- there would be a letter ballot. So then it 09:57

23 would be reflected in a letter ballot. If it's 09:51

24 editorial, the chair would accept it. 09:54

25 Q Who makes the determination for a substantive 09:59

1 Q And the -- who drafts the title, purpose and 13:03  
2 scope? 13:07

3 A The title, purpose and scope can be -- a new 13:02  
4 one can be submitted by anyone. I could submit one; 13:05  
5 you could submit one. The technical committee within 13:07  
6 ASHRAE is usually how it's submitted. 13:01

7 Q And is the technical committee, are they 13:02  
8 volunteers or are they employees of ASHRAE? 13:07

9 A Volunteers. 13:00

10 Q And the project committee as well is 13:01  
11 volunteers, correct? 13:03

12 A That's correct. 13:04

13 Q How are ASHRAE employees involved in the 13:01  
14 creation and maintenance of ASHRAE Standard 90.1? 13:05

15 A In the -- are you talking from now or are you 13:01  
16 talking about when it was first started? 13:04

17 Q Let's -- let's go from when it first started 13:07  
18 until now. 13:09

19 A So when the title, purpose and scope would 13:01  
20 have been proposed, a staff member would -- would 13:03  
21 review that to make sure it's in the correct format 13:05  
22 and, if there is some questions, would actually send it 13:09  
23 back to whoever had proposed it to make -- to correct 13:01  
24 it or say if they're okay, if we met their intent, and 13:05  
25 then send it forward to -- it probably when -- 19 -- 13:09

1 90.1 was developed in, I think, 1975. They probably 13:05  
2 didn't have all the subcommittees that we have now, but 13:01  
3 would have went through the approving bodies up through 13:04  
4 the board that way. 13:07

5 Q And would there have been a project committee 13:07  
6 as well for -- for the original 90.1? 13:09

7 A Yes. 13:01

8 Q And during that process, did staff members 13:09  
9 draft any of the text for 90.1? 13:15

10 A From the beginning? 13:10

11 Q Yeah. 13:12

12 A Not unless they were making the edits to -- 13:13  
13 because of conformity and -- or conflicts or things 13:16  
14 like that. 13:19

15 Q And would staff members have contributed any 13:12  
16 text to subsequent versions of 90.1? 13:18

17 A In the same way, either in the discussions, 13:10  
18 if there's a conflict or stuff doesn't -- or through 13:13  
19 the editing and review of the material. 13:17

20 Q And does ASHRAE have any record of that? 13:12

21 A If it was done -- it would have been done via 13:17  
22 email, at the time email started. 90.1 started before 13:10  
23 the Internet, so if the -- if -- if the records still 13:15  
24 existed, it would have been in paper format. 13:10

25 Q What is ASHRAE's purpose in creating these 13:11

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1 A No. 14:00

2 Q What -- what does it mean, then? 14:01

3 A It means -- because the IECC uses 90.1 as 14:03

4 a -- as a compliance option, if the state or 14:06

5 jurisdiction adopted it and left that requirement in 14:01

6 and did not change it, then that -- that particular 14:04

7 state or jurisdiction could use 90.1. 14:09

8 Q And on page 6, what's marked ASHRAE0003500 14:13

9 titled "Challenges to Adoption," it says, "Cost of the 14:13

10 standard," then subpoint, "Revenue objectives are 14:17

11 antithetical to widespread adoption." 14:11

12 Do you know what that statement was in 14:14

13 reference to? 14:15

14 A That people don't want to have to pay for the 14:18

15 standard, is my guess, or they think the cost of the 14:12

16 standard is too high. 14:14

17 Q Has ASHRAE received comments or complaints 14:17

18 that the cost of the -- the Standard 90.1 is too high? 14:10

19 MR. CUNNINGHAM: I'm going to object to 14:14

20 the scope. 14:16

21 THE WITNESS: That would have been 14:17

22 something that Steve Comstock would have 14:18

23 known. He's the one that deals with the 14:10

24 standards and the cost. 14:14

25 Q (BY MR. BECKER) Are you personally aware of 14:15

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1 any instances where individuals have complained about 14:17  
2 the cost of -- of the -- the 90.1 standard being too 14:11  
3 high? 14:16

4 MR. CUNNINGHAM: Object to the scope 14:16  
5 again. Ms. Reiniche is not being deposed in 14:17  
6 her personal capacity. 14:10

7 THE WITNESS: No, I'm not. 14:13

8 Q (BY MR. BECKER) Two pages after that, on 14:13  
9 ASHRAE003502, it says, "Some recognized risks." And 14:16  
10 then in the middle of that page, it says, "Code 14:11  
11 proposals that are more stringent than 90.1 viewed as a 14:13  
12 significant risk to our standing in the marketplace. 14:19  
13 Others are not passive." 14:12

14 Do you know what that refers to? 14:14

15 A That means that there's been code proposals 14:10  
16 submitted to -- to the IECC that are more stringent 14:13  
17 than 90.1. 14:18

18 Q Do you know how ASHRAE responded to this 14:17  
19 perceived risk that there were code proposals submitted 14:12  
20 that were more stringent than 90.1? 14:15

21 A If a code proposal that was submitted was 14:10  
22 more stringent than 90.1, then ASHRAE would have spoke 14:13  
23 most likely against that proposal, depending on -- 14:18  
24 there's a lot of factors that that would have been 14:14  
25 dependent on. It would have depended on what part, 14:17

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1 include ASHRAE. 17:44

2 And sent it to -- purportedly sent it to 17:46

3 media, Congress, Federal Trade Commission, 17:41

4 including salaries of the CSOs of those 17:44

5 organizations, and then indicating that 17:48

6 they're going to post those online on 17:40

7 May 1st. 17:44

8 Appears a member of the board responded 17:46

9 back to Jeff asking why ASHRAE standards 17:40

10 aren't included, and Jeff reported back that 17:43

11 he -- he doesn't know, but right now they're 17:46

12 happy to let someone else fight the battle 17:49

13 since we're not included. 17:42

14 Q (BY MR. BECKER) And this is in March 2012, 17:50

15 correct? 17:54

16 A Correct. 17:55

17 Q So ASHRAE was at the very least aware of 17:56

18 Public Resource in March of 2012, correct? 17:52

19 A Correct. 17:56

20 Q And Mr. Littleton says at the top of the page 17:52

21 in the middle of the paragraph, "Developing standards, 17:56

22 particularly those that are adopted into law, takes 17:59

23 time and resources that someone must underwrite." 17:52

24 Can you tell me about the time and resources 17:58

25 that are required to develop standards? 17:52

1           A     For 90.1, I would say it's another full-time 17:56  
2     job for the volunteers that work on that, with the 17:59  
3     amount of hours they spend on subcommittee calls where 17:51  
4     they're drafting the -- where smaller groups are 17:55  
5     drafting it based on the expertise of the different 17:58  
6     chapters within 90.1, in addition to meeting four times 17:50  
7     a -- four times a year face-to-face, full subcommittee, 17:55  
8     full project committee members -- meetings for four 17:59  
9     days straight from 8 in the morning until 10 at night. 17:52  
10    It's a huge time commitment for those volunteers. 17:55

11           Q     And he says, "particularly those that are 17:53  
12    adopted into law." Why is it particularly those that 17:57  
13    are adopted into law that take time and resources? 17:52

14           A     Because usually when it's something that's 17:57  
15    going to be adopted into law and it's going to be a 17:59  
16    major change, it -- it generates a lot of comments, not 17:52  
17    just one or two, talking 50 to a hundred lengthy 17:56  
18    comments, because people in -- in the industry have 17:52  
19    different opinions and the committee has to listen to 17:55  
20    those, look at the -- whatever technical justification 17:58  
21    they submit, determine if -- if what they're submitting 17:51  
22    is cost justified, looking at, you know, what the 17:56  
23    change would do, and if that's truly what's being done 17:50  
24    in the industry. 17:53

25                   So what -- the more significant the change, 17:54

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1 the longer it takes to get something through the 17:56  
2 standards development process. 17:58

3 Q And are there other reasons why the standards 17:52  
4 that are adopted into law would take greater time and 17:55  
5 resources? 17:53

6 A I suppose that when you're -- if you define 17:57  
7 laws including the codes, then there's the time it 17:50  
8 takes to present those changes to the code, to the 17:54  
9 testimony. Again, that's almost another full-time job, 17:57  
10 the amount of time people spend at those code hearings, 17:51  
11 talking about the issues. 17:55

12 Q And are those code hearings before 17:50  
13 governmental bodies? 17:52

14 A They're by code bodies. 17:53

15 Q Code bodies. And what do you mean by "code 17:54  
16 bodies"? 17:56

17 A International Code Council, NFPA, IATMO. 17:57

18 Q Does that also include time and resources 17:52  
19 spent working with government officials? 17:58

20 A It could, if it's going into federal 17:52  
21 regulations or federal law. 17:54

22 Q Would it also include time and resources when 17:58  
23 it's going into state regulations or state law? 17:51

24 A Yes, if -- if people are aware it's -- it's 17:55  
25 happening. 17:58

# EXHIBIT 10



## United States Department of the Interior

OFFICE OF THE SOLICITOR  
1849 C STREET, NW  
WASHINGTON, DC 20240

IN REPLY REFER TO:

**VIA U.S. MAIL**

Mr. Carl Malamud  
President, Public.Resource.Org  
1005 Gravenstein Highway North  
Sebastopol, CA 95472

**SEP - 8 2015**

Re: Your letter dated July 20, 2015

Dear Mr. Malamud,

I am writing to you on behalf of Solicitor Hilary Tompkins in response to your letter dated July 20, 2015. As you know, in that letter you identified a number of concerns with respect to the treatment of your public comment by the Bureau of Safety and Environmental Enforcement (BSEE) in conjunction with BSEE's proposed regulatory update concerning cranes mounted on fixed oil and gas platforms on the outer Continental Shelf (OCS). BSEE's proposed rule would incorporate by reference the updated Seventh Edition of American Petroleum Institute (API) Specification 2C (Spec. 2C), "Offshore Pedestal-mounted Cranes" (2012), into its regulations in place of the Sixth edition of API Spec. 2C currently incorporated by reference in BSEE regulations.<sup>1</sup>

Your principal concerns focus on two issues: the initial unavailability of your comment in Hypertext Markup Language (HTML), the native file format in which you submitted your comment, and BSEE's decision to withhold publishing two comment attachments based on BSEE's determination that those attachments contain copyrighted material. Specifically, your attachments presented the Sixth edition of API Spec. 2C in two different formats.

With respect to the first issue, it is my understanding that the administrator of the Federal Docket Management System (FDMS) is responsible for maintenance of the public dockets on regulations.gov and the manner and format in which public comments are posted on that website. In any event, as you requested, FDMS ultimately posted your comment in the HTML format. Accordingly, it appears that FDMS has addressed your concern about your comment's file format and its accessibility.

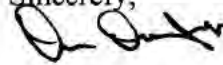
In regard to your second issue concerning copyrighted material, I have confirmed that BSEE's incorporation by reference of materials into its regulations does not waive or vitiate any applicable copyright protections associated with those materials. The Office of the Federal

<sup>1</sup> 30 C.F.R. § 250.108(c) and (d) currently require compliance with the Sixth edition of API Spec. 2C. The proposed rule would require compliance with the Seventh edition of API Spec. 2C. BSEE's current incorporation by reference of the Sixth edition of API Spec. 2C is reflected in 30 C.F.R. § 250.198(h)(69).

Register (OFR) recently explained that relevant laws “have not eliminated the availability of copyright protection for privately developed codes and standards . . . incorporated into federal regulations.” 79 Fed. Reg. 66267, 66268 (Nov. 7, 2014). Based on API’s longstanding position and BSEE’s review of the standard itself, BSEE reasonably concluded that the Sixth edition of API Spec. 2C is a privately developed standard protected by copyright maintained by API.<sup>2</sup> As OFR noted, an agency’s incorporation by reference of a copyrighted standard does not eliminate applicable copyright protections. Therefore, BSEE reasonably and properly concluded that FDMS should not post on regulations.gov the attachments associated with your comment because those attachments contained copyrighted material. BSEE also properly described its obligations concerning copyrighted material in the notice of proposed rulemaking: “When a copyrighted industry standard is incorporated by reference into our regulations, BSEE is obligated to observe and protect that copyright.”<sup>3</sup> However, consistent with BSEE’s longstanding practice, and with OFR’s regulations on incorporation by reference (1 C.F.R. § 51.5), BSEE also provided instructions in that notice on how the public may view the incorporated API standard on API’s public website.<sup>4</sup>

In addition, even though BSEE correctly decided not to post API Spec. 2C in the docket on regulations.gov because of the copyright protections, BSEE continues to make this standard available, without charge, for public review and inspection at its offices.<sup>5</sup> Thus, BSEE has made the material it proposes to incorporate by reference reasonably available to interested parties and discussed the reasonable availability of this material in accordance with 1 C.F.R. § 51.5(a)(1).

Sincerely,



Dennis Daugherty  
Assistant Solicitor, Offshore Resources  
Division of Mineral Resources  
Office of the Solicitor

Cc: Honorable Hilary C. Tompkins  
Solicitor, U.S. Department of the Interior

Mr. Brian M. Salerno  
Director, Bureau of Safety and Environmental Enforcement

---

<sup>2</sup> In fact, it is my understanding that your attachments, which reproduced the Sixth edition of API Spec. 2C, also reflected API’s copyright designation and prohibition against reproduction or transmission without prior written permission.

<sup>3</sup> 80 Fed. Reg. 34113, 34114 (June 15, 2015).

<sup>4</sup> Id.

<sup>5</sup> Id.



U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
WASHINGTON, DC 20410-3000

OFFICE OF ADMINISTRATION

AUG - 6 2015

Mr. Carl Malamud  
President and CEO  
Public Resource Organization  
1005 Gravenstein Highway North  
Sebastopol, CA 95472

RE: Freedom of Information Act Request  
FOIA Control No.: 15-FI-HQ-01670

Dear Mr. Malamud:

This letter is in response to your Freedom of Information Act (FOIA) request dated July 2, 2015. Specifically, you requested the Underwriter Laboratories (UL) 737 standard which applies to homes and manufactured housing.

When responding to a FOIA request, the Department of Housing and Urban Development searches for responsive documents existing up to the date that the request is received in the Department's FOIA Branch. Your request was received on July 2, 2015.

A search of Headquarters' records by knowledgeable staff failed to locate any documents at HUD Headquarters that would be responsive to your request. The standard that you requested is copyrighted by UL. You will need to purchase a copy of the standard directly from UL.

I am the official responsible for this determination based on information provided by the Office of Housing. You may appeal this determination within 30 days from the date of this letter. If you decide to appeal, your appeal should include copies of your original request and this response, as well as a discussion of the reasons supporting your appeal. The envelope should be plainly marked to indicate that it contains a FOIA appeal and be addressed to:

U.S. Department of Housing and Urban Development  
Attention: FOIA Appeals  
OGC, Ethics and Appeals Law Division  
451 Seventh Street, SW, Suite 213  
Washington, DC 20410

Telephone: (202) 708-3815

For your information, your FOIA request, including your identity and any information made available, is releasable to the public under subsequent FOIA requests. In responding to these requests, the Department does not release personal information, such as home address telephone number, or Social Security number, all of which are protected from disclosure under FOIA Exemption 6.

If you need additional information, please contact Ms. Eugenia Harris at (202) 402-5074. Thank you for your interest in the Department's programs and policies.

Sincerely,

*for Deborah Snowden*  
Vicky Lewis  
Deputy Director, Office  
Of the Executive Correspondence



U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
WASHINGTON, DC 20410-3000

OFFICE OF ADMINISTRATION

AUG - 6 2015

Mr. Carl Malamud  
President and CEO  
Public Resource Organization  
1005 Gravenstein Highway North  
Sebastopol, CA 95472

RE: Freedom of Information Act Request  
FOIA Control No.: 15-FI-HQ-01670

Dear Mr. Malamud:

This letter is in response to your Freedom of Information Act (FOIA) request dated July 2, 2015. Specifically, you requested the Underwriter Laboratories (UL) 737 standard which applies to homes and manufactured housing.

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Sincerely,

*for Deborah Snowden*  
Vicky Lewis  
Deputy Director, Office  
Of the Executive Correspondence



**U.S. CONSUMER PRODUCT SAFETY COMMISSION**

4330 EAST WEST HIGHWAY  
BETHESDA, MARYLAND 20814-4408

Todd A. Stevenson  
The Secretariat • Office of the Secretary  
Office of the General Counsel

Tel: 301-504-6836  
Fax: 301-504-0127  
Email: [tstevenson@cpsc.gov](mailto:tstevenson@cpsc.gov)

May 18, 2015

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Carl Malamud  
President & CEO  
Public Resource.Org  
1005 Gravenstein Highway North  
Sebastopol, CA 95472

Re: FOIA Request 15-F-00342 seeking the ASTM product standard, *ASTM F 1447-94, Standard Specification for Protective Headgear Used in Bicycling 1994 Edition*, which is incorporated by reference in 16 CFR 1203.53(b) and used in 16 CFR 1203.53(a) FCPSC interaction with the ANSI Z21/CGP Joint Central Furnace working group.

Mr. McFarlan:

Thank you for your Freedom of Information Act ("FOIA") request seeking information from the U.S. Consumer Product Safety Commission ("Commission").

The records that you seek, *ASTM F 1447-94, Standard Specification for Protective Headgear Used in Bicycling 1994 Edition*, are the copyright property of ASTM (American Society for Testing and Materials). The ASTM standard must be purchased from ASTM from their website, [www.astm.org/](http://www.astm.org/).

According to the Commission's FOIA regulations at 16 C.F.R. § 1015.7, you may appeal our decision within thirty (30) days of your receipt of this letter by writing to: FOIA APPEAL, General Counsel, ATTN: Office of the Secretary, U.S. Consumer Product Safety Commission, 4330 East West Highway, Bethesda, Maryland 20814-4408.

Processing this request, performing the file searches and preparing the information, cost the Commission \$50.00. In this instance, we have decided to waive all of the charges.

Sincerely,

A handwritten signature in black ink, appearing to read "Todd A. Stevenson".

Todd A. Stevenson

Enclosures



**U.S. CONSUMER PRODUCT SAFETY COMMISSION**

4330 EAST WEST HIGHWAY  
BETHESDA, MARYLAND 20814-4408

Todd A. Stevenson  
The Secretariat • Office of the Secretary  
Office of the General Counsel

Tel: 301-504-6836  
Fax: 301-504-0127  
Email: [tstevenson@cpsc.gov](mailto:tstevenson@cpsc.gov)

May 18, 2015

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Carl Malamud  
President & CEO  
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1005 Gravenstein Highway North  
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Re: FOIA Request 15-F-00342 seeking the ASTM product standard, *ASTM F 1447-94, Standard Specification for Protective Headgear Used in Bicycling 1994 Edition*, which is incorporated by reference in 16 CFR 1203.53(b) and used in 16 CFR 1203.53(a) (Corrected Response)

Mr. Malamud:

Thank you for your Freedom of Information Act ("FOIA") request seeking information from the U.S. Consumer Product Safety Commission ("Commission").

The records that you seek, *ASTM F 1447-94, Standard Specification for Protective Headgear Used in Bicycling 1994 Edition*, are the copyright property of ASTM (American Society for Testing and Materials). The ASTM standard must be purchased from ASTM from their website, [www.astm.org/](http://www.astm.org/).

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Sincerely,

A handwritten signature in black ink, appearing to read "Todd A. Stevenson".

Todd A. Stevenson

# EXHIBIT 12

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